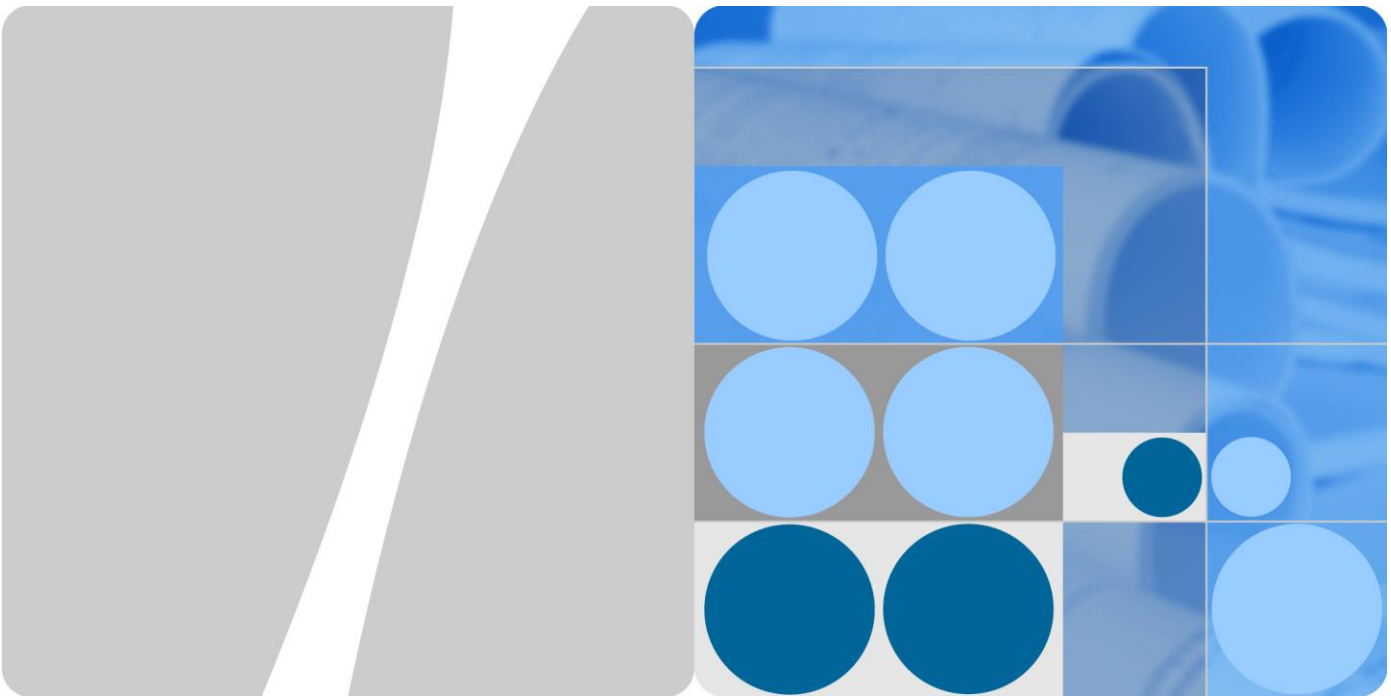

SmartLi

User Manual

Issue 05

Date 2020-03-13

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About This Document

Purpose

This document describes the SmartLi in terms of its features, performance, working principles, appearance as well as instructions for installation, and operation and maintenance (O&M).

Intended Audience

This document is intended for:

- Sales engineers
- Technical support engineers
- System engineers
- Hardware installation engineers
- Commissioning engineers
- Data configuration engineers
- Maintenance engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 05 (2020-03-13)

Added the description about how to connect a dry contact cable to a fire cylinder.

Issue 04 (2019-09-16)

Added a fire cylinder.

Issue 03 (2019-08-16)

- Updated the section "Installing Battery Modules and Cables".
- Updated the section "Replacing Parts".

Issue 02 (2019-04-08)

Updated the section "Technical Specifications".

Issue 01 (2019-01-15)

This issue is the first official release.

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1 Safety Information

1.1 General Safety

Statement

Before installing, operating, and maintaining the equipment, read this document and observe all the safety instructions on the equipment and in this document.

The "NOTICE", "CAUTION", "WARNING", and "DANGER" statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions. Huawei will not be liable for any consequence caused by the violation of general safety requirements or design, production, and usage safety standards.

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.

Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

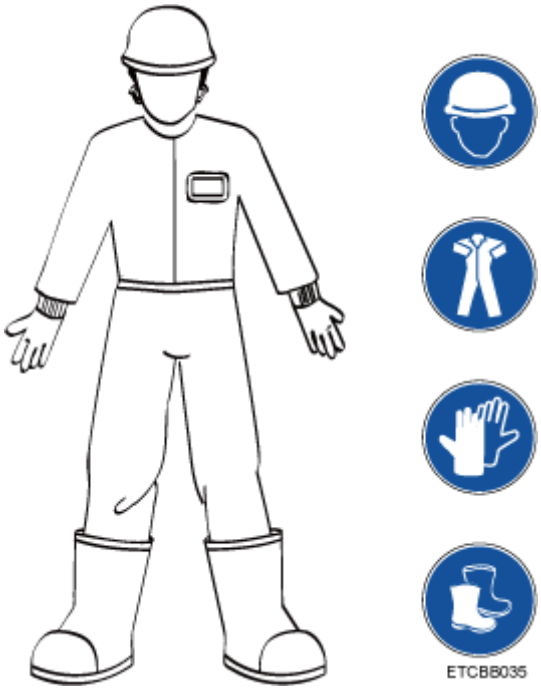
Huawei will not be liable for any consequences of the following circumstances:

- Operation beyond the conditions specified in this document
- Installation or use in environments which are not specified in relevant international or national standards
- Unauthorized modifications to the product or software code or removal of the product
- Failure to follow the operation instructions and safety precautions on the product and in this document
- Equipment damage due to force majeure, such as earthquakes, fire, and storms
- Damage caused during transportation by the customer
- Storage conditions that do not meet the requirements specified in this document

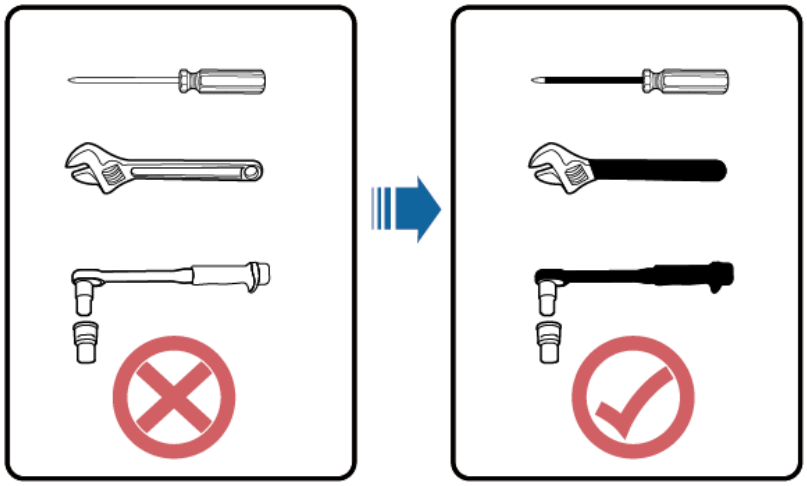
General Requirements

- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, and performing outdoor installation) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.

- Before installing, operating, or maintaining the equipment, remove any conductive objects such as watches or metal jewelry like bracelets, bangles, and rings to avoid electric shock.
- When installing, operating, or maintaining the equipment, wear dedicated protective gears such as insulation gloves, goggles, and safety clothing, helmet, and shoes, as shown in the following figure.



- Follow the specified procedures for installation, operation, and maintenance.
- Before handling a conductor surface or terminal, measure the contact point voltage and ensure that there is no risk of electric shock.
- After installing the equipment, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.
- In the case of a fire, immediately leave the building or the equipment area, and turn on the fire alarm bell or make an emergency call. Do not enter the building on fire in any case.
- Do not stop using protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment. Promptly replace warning labels that have worn out.
- Keep irrelevant people away from the equipment. Only operators are allowed to access the equipment.
- Use insulated tools or tools with insulated handles, as shown in the following figure.



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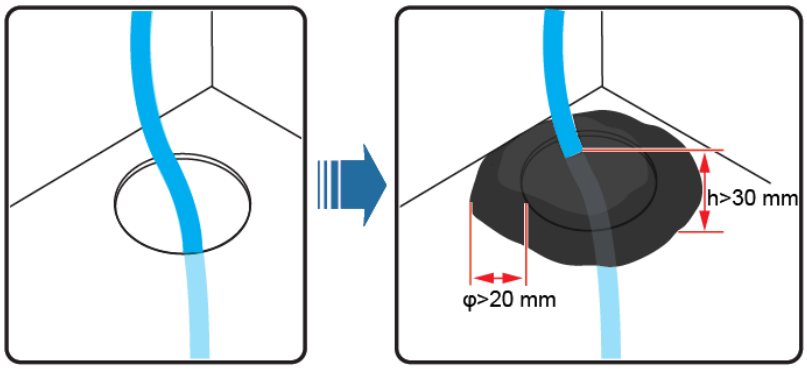
- All cable holes should be sealed. Seal the used cable holes with firestop putty. Seal the unused cable holes with the caps delivered with the cabinet. The following figure shows the criteria for correct sealing with firestop putty.



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- Do not scrawl, damage, or block any warning label on the equipment.
- Tighten the screws using tools when installing the equipment.
- Do not work with power on during installation.
- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches cannot be exposed to an outdoor environment for a long period of time.
- Before operations, ensure that the equipment is firmly secured to the floor or other solid objects, such as a wall or an installation rack.
- Do not use water to clean electrical components inside or outside of a cabinet.
- Do not change the structure or installation sequence of equipment without permission.
- Do not touch a running fan with your fingers, components, screws, tools, or boards before the fan is powered off or stops running.

Personal Safety

- If there is a probability of personal injury or equipment damage during operations on the equipment, immediately stop the operations, report the case to the supervisor, and take feasible protective measures.
- To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telecommunication network voltage (TNV) circuits.

- Do not power on the equipment before it is installed or confirmed by professionals.

1.2 Personnel Requirements

- Personnel who plan to install or maintain Huawei equipment must receive thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will operate the equipment, including operators, trained personnel, and professionals, should possess the local national required qualifications in special operations such as high-voltage operations, working at heights, and operations of special equipment.
- Professionals: personnel who are trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, maintenance
- Trained personnel: personnel who are technically trained, have required experience, are aware of possible hazards on themselves in certain operations, and are able to take protective measures to minimize the hazards on themselves and other people
- Operators: operation personnel who may come in contact with the equipment, except trained personnel and professionals
- Only professionals or authorized personnel are allowed to replace the equipment or components (including software).

1.3 Electrical Safety

Grounding

- For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.
- Do not damage the ground conductor.
- Do not operate the equipment in the absence of a properly installed ground conductor.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is securely grounded.

General Requirements

Use dedicated insulated tools when performing high-voltage operations.

AC and DC Power

DANGER

Do not connect or disconnect power cables with power on. Transient contact between the core of the power cable and the conductor will generate electric arcs or sparks, which may cause fire or personal injury.

- If a "high electricity leakage" tag is attached on the equipment, ground the protective ground terminal on the equipment enclosure before connecting the AC power supply; otherwise, electric shock as a result of electricity leakage may occur.
- Before installing or removing a power cable, turn off the power switch.
- Before connecting a power cable, check that the label on the power cable is correct.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- A circuit breaker equipped with a residual current device (RCD) is not recommended.
- A damaged power cable must be replaced by the manufacturer, service agent, or professionals to avoid risks.
- High voltage operations and installation of AC-powered facilities must be performed by qualified personnel.

Cabling

- When routing cables, ensure that a distance of at least 30 mm exists between the cables and heat-generating components or areas. This prevents damage to the insulation layer of the cables.
- Do not route cables behind the air intake and exhaust vents of the equipment.
- Ensure that cables meet the VW-1 flame spread rating requirements.
- Bind cables of the same type together. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- If an AC input power cable is connected to the cabinet from the top, bend the cable in a U shape outside the cabinet and then route it into the cabinet.
- When the temperature is low, violent impact or vibration may damage the plastic cable sheathing. To ensure safety, comply with the following requirements:
- Cables can be laid or installed only when the temperature is higher than 0°C. Handle cables with caution, especially at a low temperature.
- Cables stored at subzero temperatures must be stored at room temperature for at least 24 hours before they are laid out.
- Do not perform any improper operations, for example, dropping cables directly from a vehicle.
- When selecting, connecting, and routing cables, follow local safety regulations and rules.

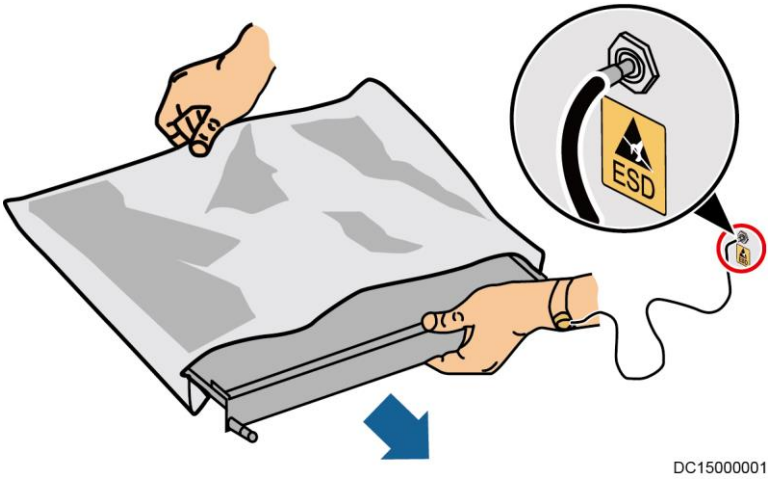
ESD

NOTICE

The static electricity generated by human bodies may damage the electrostatic-sensitive components on boards, for example, the large-scale integrated (LSI) circuits.

- Wear ESD gloves or a well-grounded ESD wrist strap when touching the device or handling boards or application-specific integrated circuits (ASICs).
- When holding a board, hold its edge without touching any components. Do not touch the components with your bare hands.
- Package boards with ESD packaging materials before storing or transporting them.

Figure 1-1 Wearing an ESD wrist strap



Neutral-Ground Voltage

It is recommended that the three-phase loads be equalized and the neutral-ground voltage be kept at less than 2 V to meet power distribution requirements.

1.4 Installation Environment Requirements

- To prevent fire due to high temperature, ensure that the ventilation vents or heat dissipation system are not blocked when the equipment is running.
- Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as under water pipes and air exhaust vents, or areas prone to water leakage, such as air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that no liquid enters the equipment to prevent faults or short circuits.
- If any liquid is detected inside the equipment, immediately disconnect the power supply and contact the administrator.
- Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.
- Ensure that the equipment room provides good heat insulation, and the walls and floor are dampproof.
- Install a rat guard at the door of the equipment room.

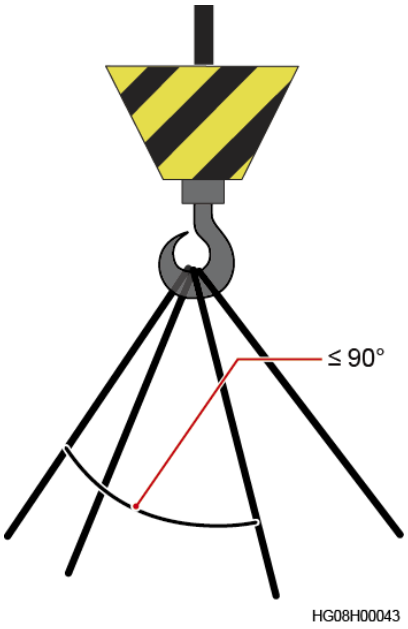
Installation at Heights

- Working at heights refers to operations that are performed at least 2 meters above the ground.
- Do not work at heights if the steel pipes are wet or other potential danger exists. After the preceding conditions no longer exist, the safety director and relevant technical personnel need to check the involved equipment. Operators can begin working only after obtaining consent.
- When working at heights, comply with local relevant laws and regulations.
- Only trained and qualified personnel are allowed to work at heights.
- Before working at heights, check the climbing tools and safety gears such as safety helmets, safety belts, ladders, springboards, scaffolding, and lifting equipment. If they do not meet the requirements, take corrective measures or disallow working at heights.
- Wear personal protective equipment such as the safety helmet and safety belt or waist rope and fasten it to a solid structure. Do not mount it on an insecure moveable object or metal object with sharp edges. Make sure that the hooks will not slide off.
- Set a restricted area and eye-catching signs for working at heights to warn away irrelevant personnel.
- Carry the operation machinery and tools properly to prevent them from falling off and causing injuries.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects should be transported by tough slings, hanging baskets, highline trolleys, or cranes.
- Ensure that guard rails and warning signs are set at the edges and openings of the area involving working at heights to prevent falls.
- Do not pile up scaffolding, springboards, or other sundries on the ground under the area involving working at heights. Do not allow people to stay or pass under the area involving working at heights.
- Inspect the scaffolding, springboards, and workbenches used for working at heights in advance to ensure that their structures are solid and not overloaded.
- Any violations must be promptly pointed out by the site manager or safety supervisor and the involved personnel should be prompted for correction. Personnel who fail to stop violations will be forbidden from working.

1.5 Mechanical Safety

Hoisting Devices

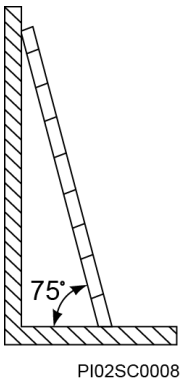
- Do not walk under hoisted objects.
- Only trained and qualified personnel should perform hoisting operations.
- Check that hoisting tools are available and in good condition.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a load-bearing object or wall.
- Ensure that the angle formed by two hoisting cables is no more than 90 degrees, as shown in the following figure.



- Do not drag steel ropes and hoisting tools or bump hoisted objects against hard objects during hoisting.

Using Ladders

- Use wooden or fiberglass ladders when you need to perform live working at heights.
- When a step ladder is used, ensure that the pull ropes are secured and the ladder is held firm.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned. The recommended angle for a ladder against the floor is 75 degrees, as shown in the following figure. An angle rule can be used to measure the angle. Ensure that the wider end of the ladder is at the bottom, or protective measures have been taken at the bottom to prevent the ladder from sliding.



- When climbing a ladder, take the following precautions to reduce risks and ensure safety:
- Keep your body steady.
- Do not climb higher than the fourth rung of the ladder from the top.
- Ensure that your body's center of gravity does not shift outside the legs of the ladder.

Drilling Holes

When drilling holes into a wall or floor, observe the following safety precautions:

NOTICE

Do not drill holes into the equipment. Doing so may affect the electromagnetic shielding of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

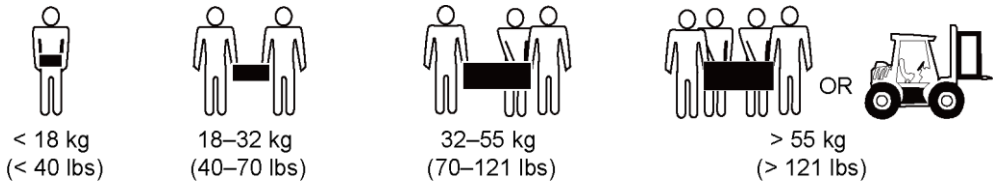
- Obtain the consent from the customer, subcontractor, and Huawei before drilling.
- Wear goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

Moving Heavy Objects

DANGER

When removing a heavy or unstable component from a cabinet, be aware of unstable or heavy objects on the cabinet.

- Be cautious to avoid injury when moving heavy objects.



- When moving the equipment by hand, wear protective gloves to prevent injuries.
- Move or lift the equipment by holding its handles or lower edges. Do not hold the handles of modules (such as power supply units, fans, and boards) that are installed in the equipment because they cannot support the weight of the equipment.
- Avoid scratching the cabinet surface or damaging cabinet components and cables during equipment transportation.
- When transporting the equipment using a forklift truck, ensure that the forks are properly positioned to ensure that the equipment does not topple. Before moving the equipment, secure it to the forklift truck using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose railways, sea, or a road with good condition for transportation to ensure equipment safety. Avoid tilt or jolt during transportation.
- Move a cabinet with caution. Any bumping or falling may damage the equipment.

1.6 Battery Safety

Basic Requirements

Before operating batteries, carefully read the safety precautions for battery handling and master the correct battery connection methods.

DANGER

- Do not expose batteries at high temperatures or around heat-generating devices, such as sunlight, fire sources, transformers, and heaters. Excessive heat exposure may cause the batteries to explode.
- Do not burn batteries. Otherwise, the batteries may explode.
- To avoid leakage, overheating, fire, or explosions, do not disassemble, alter, or damage batteries, for example, insert sundries into batteries or immerse batteries in water or other liquids.

- Wear goggles, rubber gloves, and protective clothing to prevent skin contact with electrolyte in the case of electrolyte overflow. If a battery leaks, protect the skin or eyes from the leaking liquid. If the skin or eyes come in contact with the leaking liquid, wash it immediately with clean water and go to the hospital for medical treatment.
- Use dedicated insulated tools.
- Move batteries in the required direction. Do not place a battery upside down or tilt it.
- Keep the battery loop disconnected during installation and maintenance.
- Use batteries of specified models. Using batteries of other models may damage the batteries.
- Dispose of waste batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste. If a battery is disposed of improperly, it may explode.
- The site must be equipped with qualified fire extinguishing facilities, such as firefighting sands and powder fire extinguishers.

NOTICE

To ensure battery safety and battery management accuracy, use batteries provided with the UPS by Huawei. Huawei is not responsible for any battery faults caused by batteries not provided by Huawei.

Battery Installation

Before installing batteries, observe the following safety precautions:

- Install batteries in a well-ventilated, dry, and cool environment that is far away from heat sources, flammable materials, moistures, extensive infrared radiation, organic solvents, and corrosive gases. Take fire prevention measures.
- Place and secure batteries horizontally.

- Note the polarities when installing batteries. Do not short-circuit the positive and negative poles of the same battery or battery string. Otherwise, the battery may be short-circuited.
- Check battery connections periodically, ensuring that all bolts are securely tightened.
- When installing batteries, do not place installation tools on the batteries.

Battery Short Circuit

DANGER

Battery short circuits can generate high instantaneous current and release a great amount of energy, which may cause equipment damage or personal injury.

To avoid battery short-circuit, do not maintain batteries with power on.

Flammable Gas

NOTICE

- Do not use unsealed lead-acid batteries.
- To prevent fire or corrosion, ensure that flammable gas (such as hydrogen) is properly exhausted for lead-acid batteries.

Lead-acid batteries emit flammable gas when used. Ensure that batteries are kept in a well-ventilated area and take preventive measures against fire.

Battery Leakage

NOTICE

Battery overheating causes deformation, damage, and electrolyte spillage.

WARNING

When the electrolyte overflows, absorb and neutralize the electrolyte immediately. When moving or handling a battery whose electrolyte leaks, note that the leaking electrolyte may hurt human bodies.

- If the battery temperature exceeds 60°C, check for and promptly handle any leakage.
- Electrolyte overflow may damage the equipment. It will corrode metal parts and boards, and ultimately damage the boards.
- If the electrolyte overflows, follow the instructions of the battery manufacturer or neutralize the electrolyte by using sodium bicarbonate ($NaHCO_3$) or sodium carbonate (Na_2CO_3).

Lithium Battery

The safety precautions for lithium batteries are similar to those for lead-acid batteries except that you also need to note the precautions described in this section.

⚠ WARNING

There is a risk of explosion if a battery is replaced with an incorrect model.

- A battery can be replaced only with a battery of the same or similar model recommended by the manufacturer.
- When handling a lithium battery, do not place it upside down, tilt it, or bump it with other objects.
- Keep the lithium battery loop disconnected during installation and maintenance.
- Do not charge a battery when the ambient temperature is below the lower limit of the operating temperature (charging is forbidden at 0°C). Low-temperature charging may cause crystallization, which will result in a short circuit inside the battery.
- Use batteries within the allowed temperature range; otherwise, the battery performance and safety will be compromised.
- Do not throw a lithium battery in fire.
- When maintenance is complete, return the waste lithium battery to the maintenance office.

1.7 Others

- Exercise caution when manually shutting down the UPS inverter for transferring to bypass mode, or when adjusting the UPS output voltage level or frequency. Doing so may affect the power supply to equipment.
- Exercise caution when setting battery parameters. Incorrect settings will affect the power supply and battery lifespan.

2 Overview

The SmartLi provides backup power for a medium- and large-power UPS. With a neutral wire, the SmartLi is compatible with a UPS system with or without a neutral wire. The lithium battery cabinet supports power backup, battery management, and output DC-DC adjustment. When multiple battery strings are connected in parallel, the output of each battery string is balanced and reliable protection is achieved.

2.1 Model Description

Figure 2-1 SmartLi model number

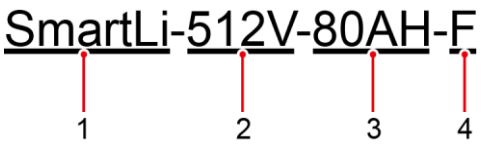


Table 2-1 Model number details

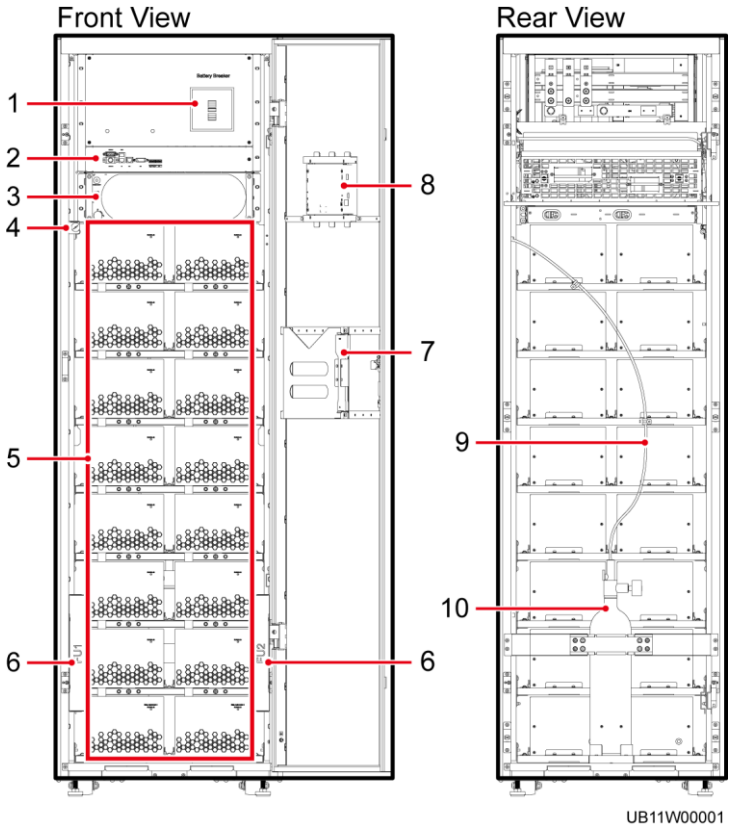
No.	Item	Description
1	Product category	SmartLi
2	SmartLi subcategory	512 V
3	Capacity	80AH: battery capacity being 80 Ah
4	Configuration type	• F: with an LCD • S: without an LCD

2.2 Product Introduction

2.2.1 Product Structure

The battery cabinet consists of 16 battery modules, which are equally divided into two parallel strings. Eight battery modules are connected in series in each string.

Figure 2-2 Product structure



(1) Battery circuit breaker (2) Monitoring module (3) Battery control unit

(4) End pressure gauge (5) Battery module (6) Fuse

(7) Auxiliary wrench (8) MDU (9) Fire-trace tube

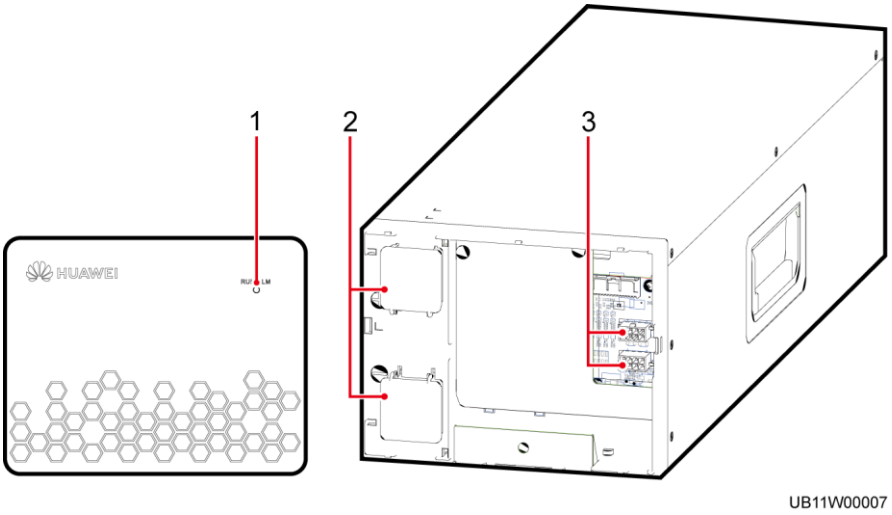
(10) Fire cylinder

NOTE

The auxiliary wrench is used to assist in turning on and off the battery switch.

2.2.2 Battery Module

Figure 2-3 Battery module



(1) Running indicator (2) Battery wiring terminals (3) Cascading terminals

Table 2-2 Indicator description

Indicator	Status	Color	Description
Indicator	On	Green	The battery module is normal.
		Red	The battery module is faulty.
	Off	-	The communications cable to the battery module is not connected.

Function

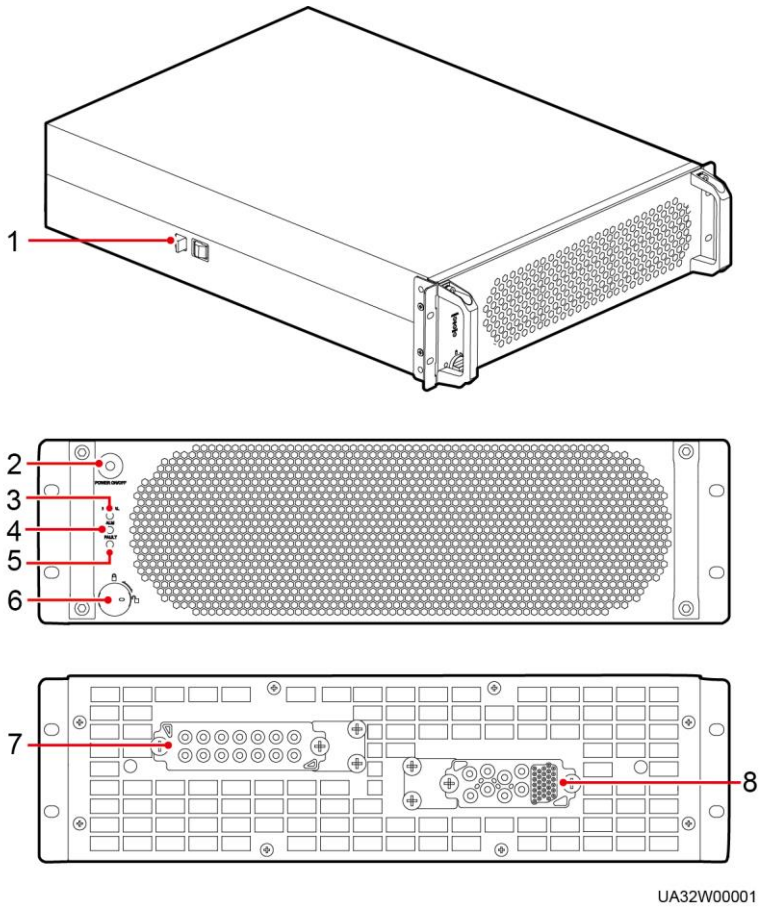
The battery module can be connected in series to adjust the system voltage. All external ports of the module are located at the front to facilitate installation and maintenance.

Specifications

- Dimensions (H x W x D): 155.5 mm x 200.5 mm x 592 mm
- Weight: ≤ 30 kg
- Rated voltage: 64 V
- Rated capacity: 40 Ah
- Rated discharge current: 160 A

2.2.3 Battery Control Unit

Figure 2-4 Battery control unit



(1) Positioning lock (2) Power switch (3) Run indicator (4) Alarm indicator

(5) Fault indicator (6) Ready switch (7) Output port (8) Input port

Table 2-3 Indicator description

Status	Color	Description
On	Green	The battery cabinet is working properly.
	Yellow	The battery cabinet generates a minor alarm.
	Red	The battery cabinet generates a critical alarm.
Off	-	The battery cabinet is shut down.

Function

The battery control unit supports hot swap, converts the battery string power, and provides battery management.

Specifications

- Dimensions (H x W x D): 130 mm x 422 mm x 550 mm
- Weight: < 30 kg

2.2.4 Monitoring Module

The monitoring module provides the inter-battery cabinet parallel port, FE port, RS485 port, and EPO port.

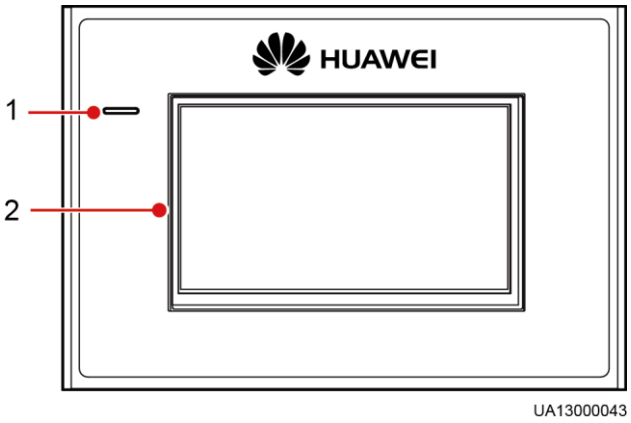
Figure 2-5 Monitoring module

Table 2-4 Ports

Port	Silkscreen	Description
Parallel port	PARALLEL1	Indicates parallel signal port 1 between racks.
Parallel port	PARALLEL2	Indicates parallel signal port 2 between racks.
Network port	FE	Connects to the network port on a PC.
Northbound communications interface	RS485	Reserved.
Northbound communications interface	COM	Connects to an UPS.
DB26	MDU	Supports FE, RS485, I2C, CAN and other signals.
DO_1	DO_1	Reserved.
DO_2	DO_2	Reserved.
EPO	NO	If the normally open (NO) port is connected to the EPO_12V port, EPO is triggered.
	12V	
	NC	If the normally closed (NC) port is disconnected from the EPO_12V port, EPO is triggered.
	12V	

2.2.5 Monitor Display Unit (MDU)

Figure 2-6 MDU



(1) Status indicator (2) LCD touchscreen

Table 2-5 Status indicator

Status	Color	Meaning
On	Red	A critical alarm has been generated, and the buzzer sounds continuously.
	Yellow	A minor alarm has been generated, and the buzzer buzzes at 2 Hz.
	Green	The SmartLi is running properly or a warning has been generated.
Off	N/A	The MDU is powered off.

The ports of the MDU are located at the side of the LCD screen.

Figure 2-7 MDU ports

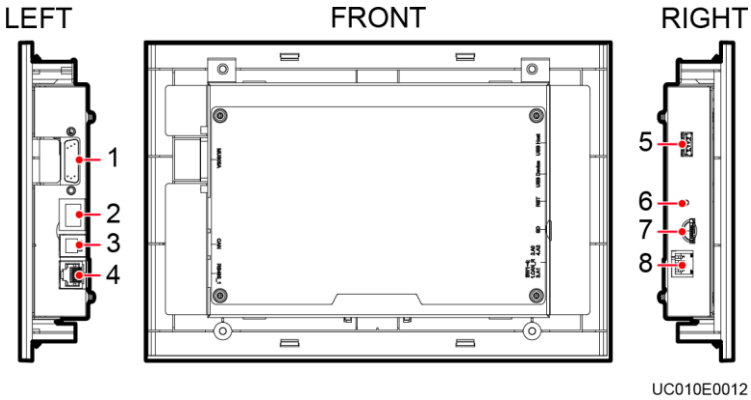


Table 2-6 Description of MDU ports

No.	Port Name	Description
1	MUS05A (DB26)	Connects to the monitoring module.
2	FE	Network port
3	CAN	Reserved
4	RS485_1	Reserved
5	USB Host	Connects to a USB flash drive, used for upgrading the LCD online and upgrading configurations. The port is protected by a security mechanism.
6	RST	Restart switch for the MDU
7	SD	Reserved
8	DIP switch	Implements specific functions by using the DIP switch and specific buttons; controls the CAN communication build-out resistor in a parallel system

Functions

The monitor display unit (MDU) allows for general SmartLi operations, parameter setting, viewing of running status and alarms, and so on.

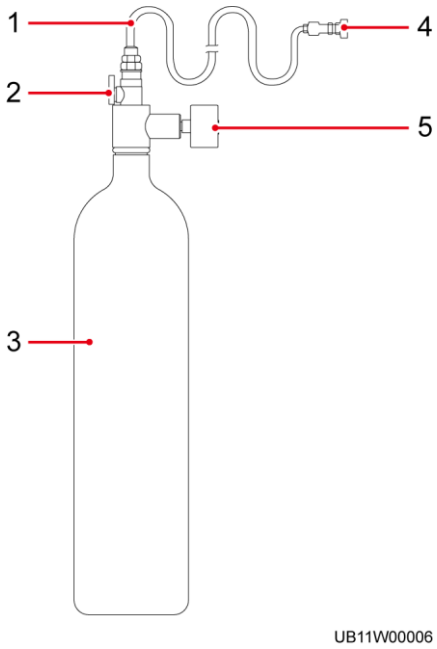
Specifications

Dimensions (H x W x D): 175 mm x 264 mm x 40 mm

2.2.6 Fire Detection and Extinguishing Equipment

The fire detection and extinguishing equipment consists of a pressurized container filled with extinguishant, a valve, and a fire-trace tube that can release extinguishant. It can detect and extinguish fire at the initial stage quickly, accurately, and effectively.

Figure 2-8 Appearance



(1) Fire-trace tube (2) Valve (3) Pressurized container

(4) End pressure gauge (5) Pressure gauge

Specifications

Recommended extinguishant: heptafluoropropane or perfluorohexone

Extinguishant amount: 3 kg

Operating temperature: 0°C to 50°C

3 Installation

3.1 Installation Preparations

3.1.1 Site

3.1.1.1 Installation Environment

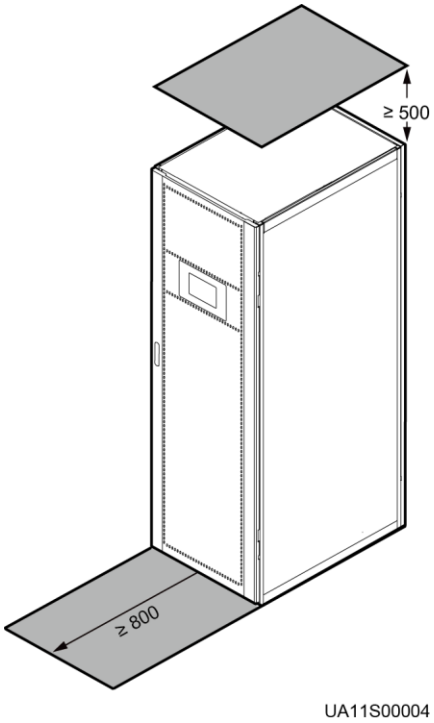
- Do not install the SmartLi in high temperature, low temperature, or damp environments.
- Install the SmartLi away from water sources, heat sources, and flammable or explosive materials.
- Keep the SmartLi away from direct sunlight, dust, volatile gases, corrosive materials, and air dense with salt particles.
- Do not install the SmartLi in environments with conductive metal scraps in the air.

3.1.1.2 Installation Clearances

Reserve the following clearances around the cabinet to facilitate operations and ventilation:

- Reserve at least 800 mm from the front of the cabinet.
- Reserve at least 500 mm from the top of the cabinet.
- The SmartLi can be installed against a wall and no space needs to be reserved at the rear.
- If an antiseismic kit is deployed, at least 500 mm space should be reserved at the rear for operations.

Figure 3-1 Reserved clearances (unit: mm)



3.1.2 Tools and Instruments

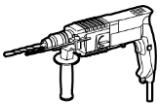
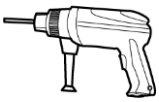
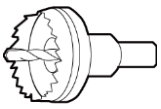
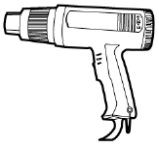
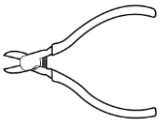
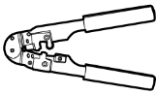
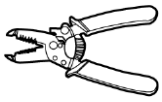
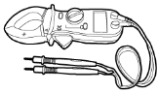
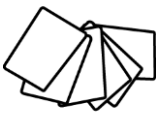
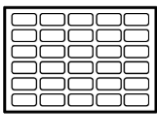
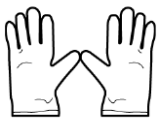
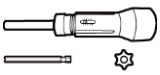
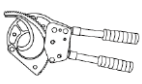
CAUTION

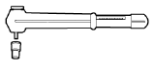
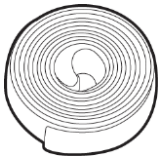
Insulate installation tools to prevent electric shocks.

Prepare the following tools and meters indicated in Table 3-1 for installation.

Table 3-1 Tools and meters

Tools and Meters			
Electric pallet truck	Manual pallet truck	Ladder	Rubber mallet
			
Hammer drill and drill bit Φ16	Hand-held electric drill	Alloy hole saw	Heat gun

Tools and Meters			
			
Diagonal pliers	Crimping tools	Wire stripper	Electric hydraulic pliers
			
Clamp meter	Multimeter	Cable tie	Level instrument
			
Polyvinyl chloride (PVC) insulation tape	Cotton cloth	Label	Electrician's knife
			
Electrostatic discharge (ESD) gloves	Protective gloves	Insulated gloves	Insulation protective shoes
			
Torque screwdriver	Cable cutter	Brush	Flat-head screwdriver (2–5 mm)
			
Phillips screwdriver (M3/M4/M5/M6/M8)	Insulated torque wrench (M6/M8/M12/M16)	Heat shrink tubing	Insulated adjustable wrench

Tools and Meters			
			

NOTE

Table 3-1 lists only the common tools for installation and cable connection. For more dedicated tools required, see the corresponding component manuals. Prepare tools based on site requirements.

3.1.3 Unpacking and Checking

Context

NOTICE

- To prevent the SmartLi from falling over, secure it to a pallet truck using ropes before moving it.
- To prevent shocks or falls, move the SmartLi gently. After placing the SmartLi in the installation position, unpack it and take care to prevent scratches. Keep the SmartLi steady during unpacking.
- To prevent dust from settling on the SmartLi, leave the original plastic coat on until installation is required.
- Battery modules are transported separately.

Procedure

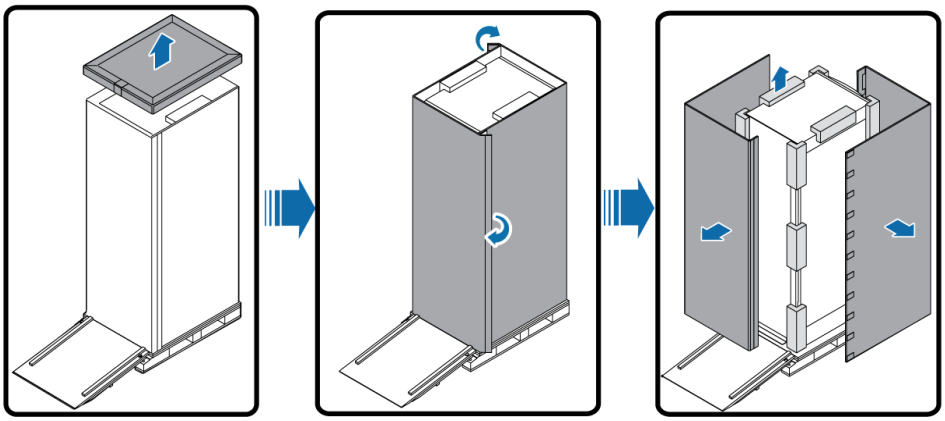
Step 1 Use a pallet truck to transport the SmartLi to the installation position.

Step 2 Check the SmartLi packing.

Step 3 Hold the sliding plate steady. Cut and remove the binding tapes. Put down the sliding plate gently.

Step 4 Remove packing materials.

Figure 3-2 Removing packing materials



Step 5 Remove the plastic bag and take out the fittings box.

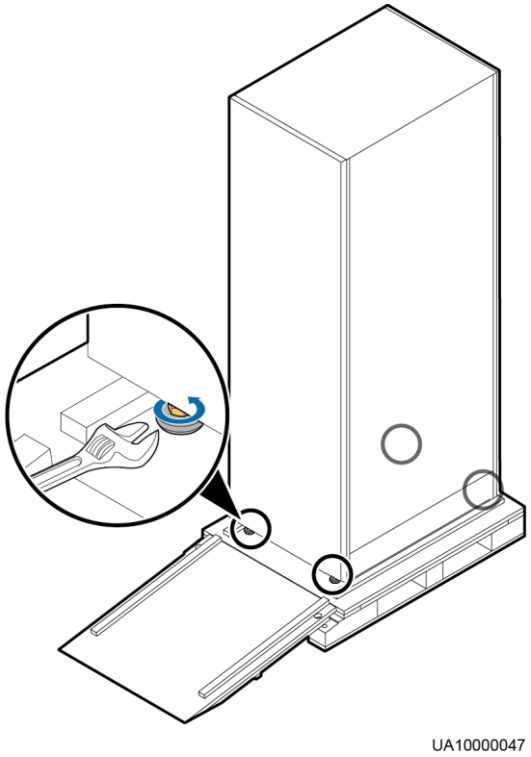
Step 6 Check that the SmartLi is intact.

1. Visually inspect the SmartLi appearance for shipping damage. If it is damaged, notify the carrier immediately.
2. Check that all fittings comply with the packing list. If some fittings are missing or do not comply with the packing list, record this information and contact your local Huawei office immediately.

Step 7 Remove the L-shaped bracket that secures the cabinet and the pallet, and secure the sliding plate to the pallet by using the two M12 screws that were removed.

Step 8 Raise the four anchor bolts to the highest position using an adjustable wrench.

Figure 3-3 Raising anchor bolts



Step 9 Push the cabinet along the sliding plate to the floor.

----End

3.2 Single SmartLi Installation

3.2.1 Installing a Fire Cylinder

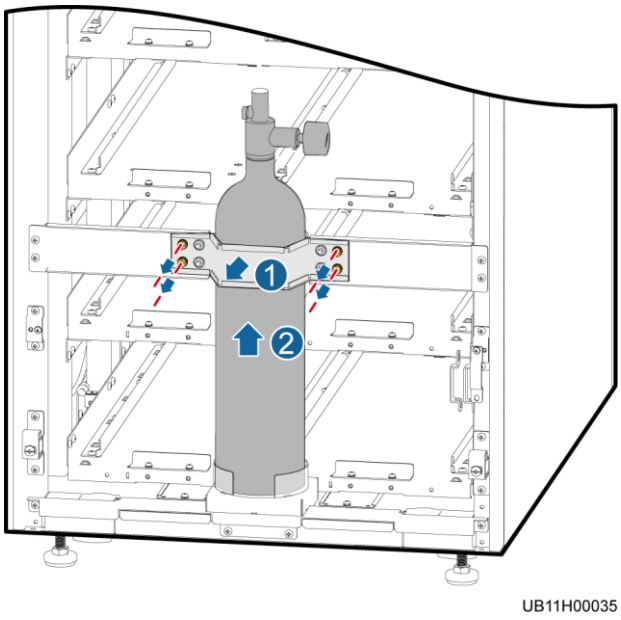
Procedure

Step 1 Remove the rear panel of the cabinet.

Step 2 Remove the fire cylinder.

1. Remove the fire cylinder fastener.
2. Take out the fire cylinder.

Figure 3-4 Removing the fire cylinder



Step 3 Check the fire cylinder and all components for any damage, abrasion, or corrosion. If there is any visible abrasion or corrosion, replace the damaged components and all corroded components.

Step 4 Send the fire cylinder to the gas station to fill extinguishant. Heptafluoropropane or perfluorohexone is recommended. The required amount is 3 kg.

NOTICE

- In the process of assembling and filling, please pay attention that the valve, container and other parts should keep clean and not polluted.
- This filling instruction only refers to the process of valve installation and extinguishing agent filling, and the rest should be performed according to the filling process of each filling station (including bottle washing, pressure testing, etc.).

1. Install the hose to the fire cylinder and tighten the connection nut.
2. Remove the valve positioning kit and open the valve.
3. Fill extinguishant into the fire cylinder through the hose.
4. After the extinguishant is filled, close the valve.
5. Slowly fill the drive gas (nitrogen) through the hose and open the valve again.
6. Shake the cylinder evenly and keep the pressure in the cylinder in the range of 1.7–1.8 MPa at 20°C.
7. After the pressure is stable, close the valve.
8. Reinstall the valve positioning kit.

Step 5 Check the status of the fire cylinder after filling extinguishing agent. If the fire cylinder is not installed in the cabinet immediately after extinguishing agent is filled, check the status of the fire cylinder again before installation.

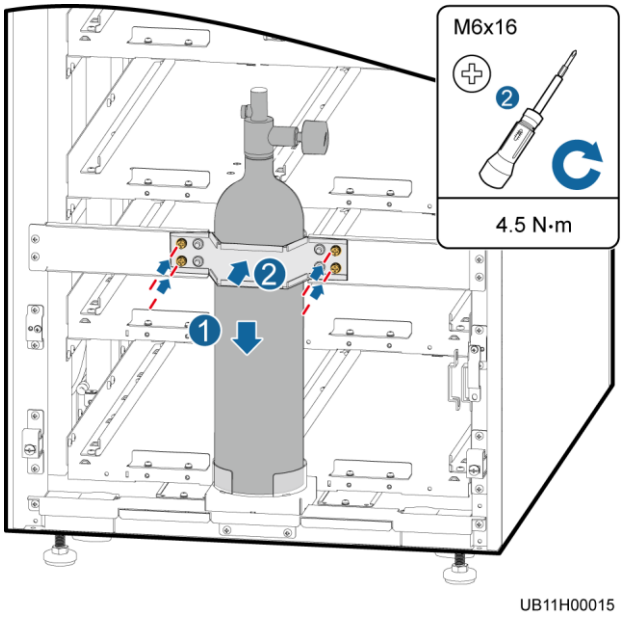
- Check that the valve is closed (vertical to the cylinder).
- Check that the reading of the pressure gauge on the fire cylinder is greater than 1.6 MPa at 20°C and the pointer is in the green zone.

Step 6 Install the fire cylinder.

NOTICE

- Keep the fire cylinder upright.
- Ensure that the front of the pressure gauge faces the right side of the cabinet (as shown in the figure) and that the cylinder does not interfere with the battery trays and the rear cover of the cabinet.

Figure 3-5 Installing a fire cylinder



Step 7 Install the fire-trace tube on the fire cylinder.

NOTICE

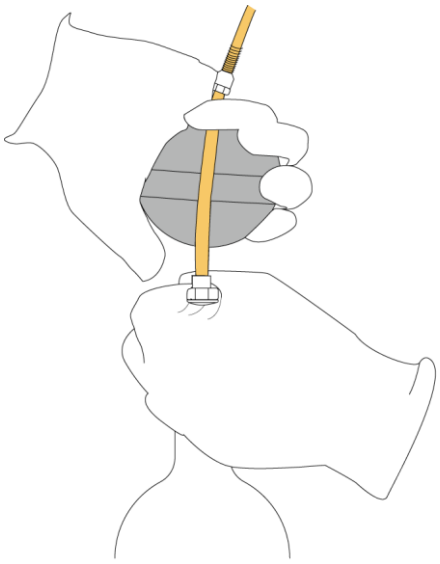
Do not bend or twist the fire-trace tube or bind the tube using cable ties. Otherwise, the fire cylinder may fail.

1. Clamp the end of the fire-trace tube to the threaded nozzle using a pipe holder.

NOTICE

Hold the pipe holder close to the end to avoid bending the tube during pipe insertion.

Figure 3-6 Installing a fire-trace tube



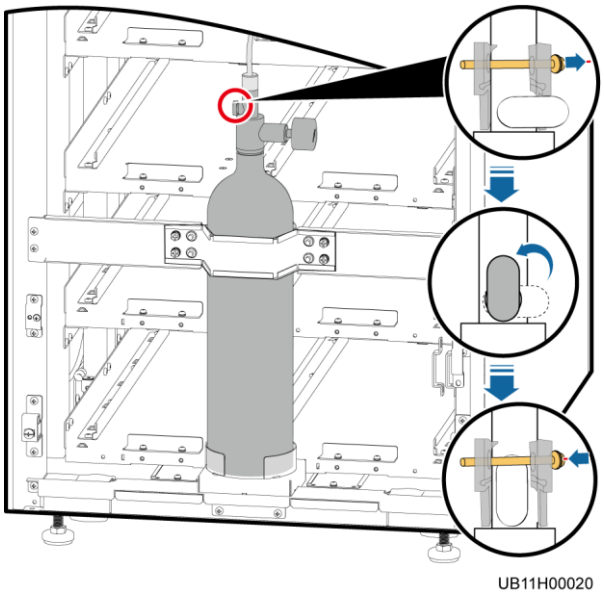
2. Tighten the connection nut to 7 N·m using an adjustable torque wrench.

Step 8 Remove the valve positioning kit, open the valve, reinstall the positioning kit, and secure it.

NOTICE

Slowly open the valve. To avoid unexpected blowout, do not quickly open the valve.

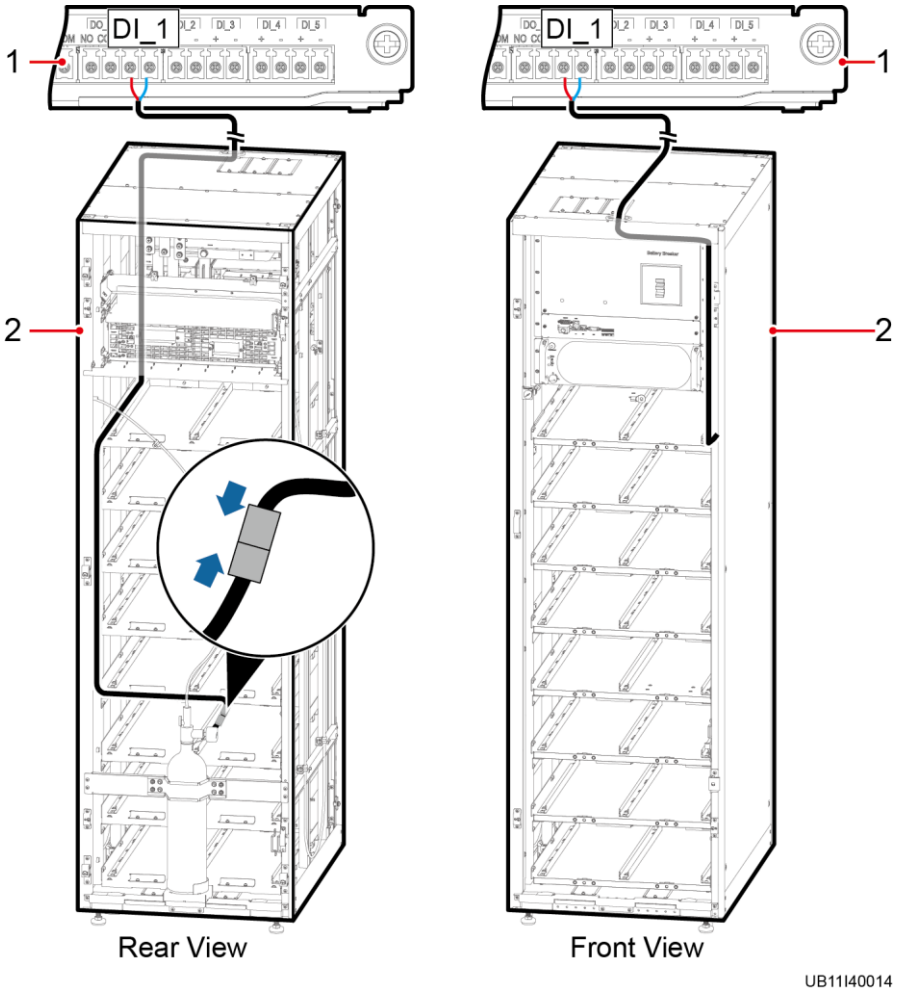
Figure 3-7 Opening the valve



Step 9 Install a dry contact cable.

1. Connect one end of a cable to the dry contact cable of the fire cylinder.
2. Secure the cable, as shown in the following figure.
3. Connect the other end of the dry contact cable to the DI_1 port on the dry contact expansion card of the UPS. (If cabinets are combined, connect cables to ports DI_1 to DI_5.)

Figure 3-8 Installing a dry contact cable



(1) Dry contact expansion card of the UPS (2) SmartLi

NOTE

In a parallel system, connect fire control dry contact cables of battery cabinets 1 to 5 respectively to ports DI_1 to DI_5 on the dry contact expansion card of the UPS. Each dry contact expansion card can connect to a maximum of five battery cabinets.

Step 10 Check the end pressure gauge on the front of the cabinet. The pointer should be in the green zone and the pressure reading should be greater than 1.6 MPa at 20°C. Record the reading of the pressure gauge. 8 hours later, observe the pressure gauge again. The pressure reading should remain unchanged.

----End

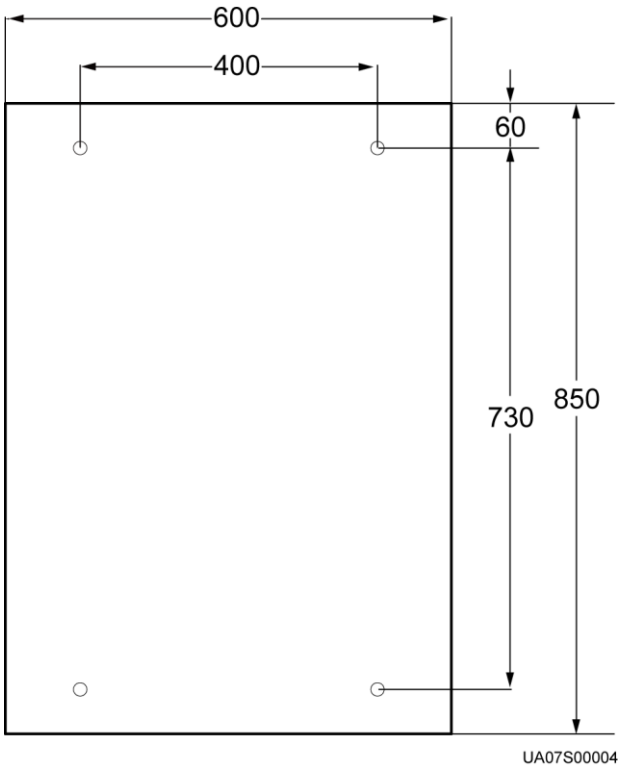
3.2.2 Installing a SmartLi

3.2.2.1 Securing Installation

Procedure

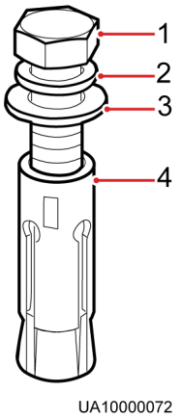
Step 1 Determine the cabinet installation position. Draw mounting holes in the installation position according to the drawings.

Figure 3-9 Mounting holes (unit: mm)



Step 2 Use a hammer drill to drill holes for installing expansion bolts and then install four expansion bolts in the holes.

Figure 3-10 Expansion bolt composition

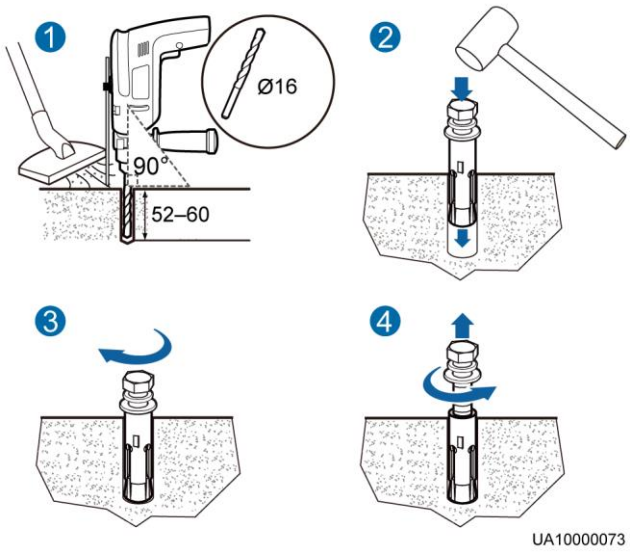


(1) M12 bolt (2) Spring washer (3) Flat washer (4) Expansion sleeve

NOTICE

Knock the expansion bolt into the hole until the expansion tube completely fits into the hole. The expansion sleeve must be completely buried under the ground to facilitate subsequent installation.

Figure 3-11 Installing an expansion bolt (unit: mm)

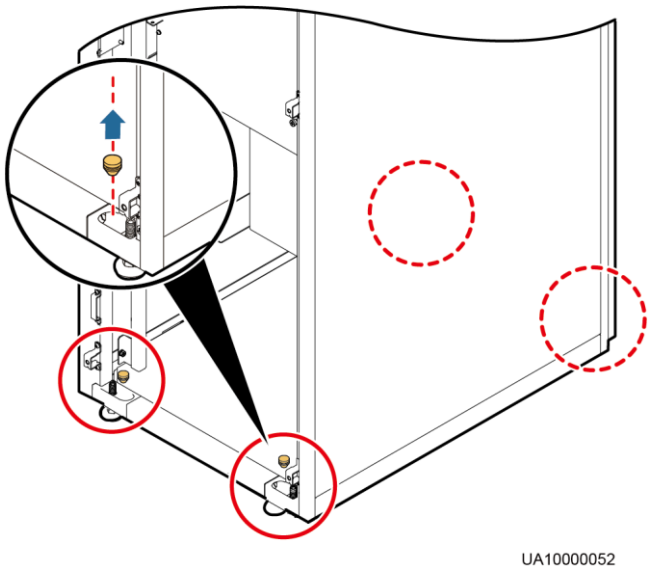


1. Drill a hole into the concrete floor using a hammer drill. The hole depth ranges from 52 mm to 60 mm.
2. Slightly tighten the expansion bolt and vertically insert it into the hole. Knock the expansion bolt using a hammer until the expansion sleeve is fully inserted into the hole.
3. Partially tighten the expansion bolt.
4. Remove the bolt, spring washer, and flat washer.

Step 3 Wheel the cabinet to the installation position.

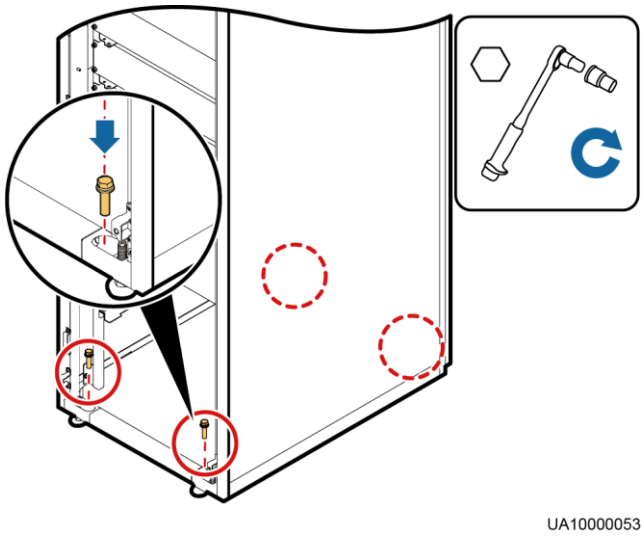
Step 4 Open the front door and remove the four plugs from the bottom of the cabinet.

Figure 3-12 Removing plugs



Step 5 Insert four M12x115 expansion bolts into the expansion bolt holes in the floor, and tighten the expansion bolts.

Figure 3-13 Tightening expansion bolts



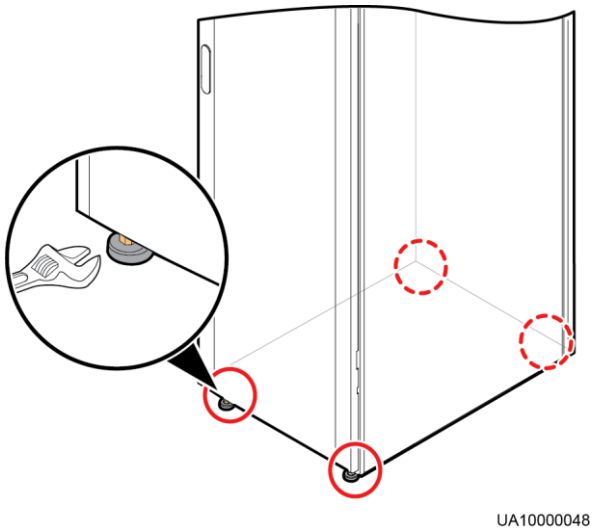
----End

3.2.2.2 Non-Secure Installation

Procedure

Step 1 Adjust the four anchor bolts at the bottom of the cabinet until all the four castors at the bottom hang in the air and the anchor bolts bear all of the cabinet weight.

Figure 3-14 Castors hanging in the air



Step 2 Check the cabinet levelness using a level instrument. If the cabinet is not level, wrench the anchor bolts.

----End

3.2.3 Routing Cables

3.2.3.1 SmartLi Cable Connection Reference

Context

CAUTION

- Keep away from cabinets when preparing cables to prevent cable scraps from entering the cabinets. Cable scraps may cause ignition during power-on and result in personal injury and device damage.
- After installing cables, clean the cabinet top, bottom, copper bar wiring positions, and other positions. Ensure that there is no dust or scraps inside and around cabinets.
- Prepare terminals onsite. The length of the copper wire should be the same as that of the part of the terminal that covers the conductor.

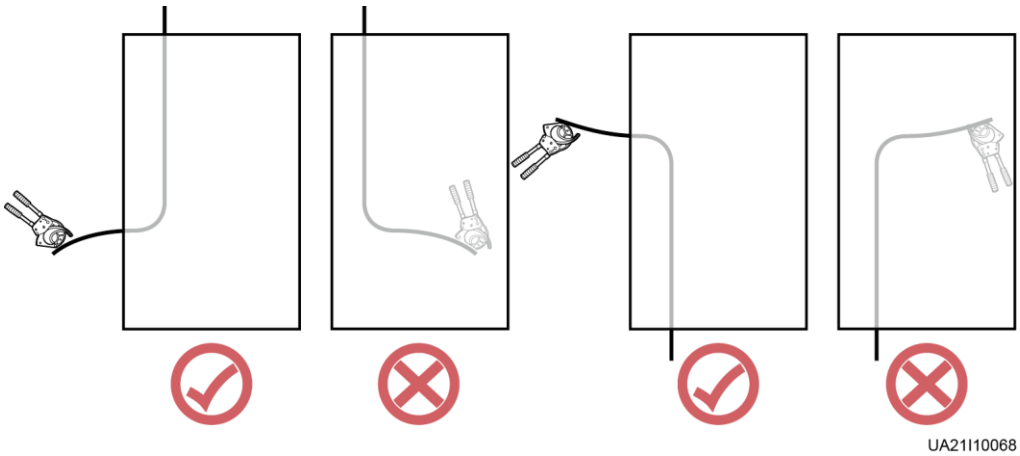
Procedure

Step 1 Route a cable into the cabinet and bind it to a nearby beam.

Step 2 Pull the cable to the copper bar to which the cable is to be connected, determine the cable length, and mark the cable at the position where the cable is to be cut.

Step 3 Pull the marked cable out of the cabinet, cut the cable from the marked position, strip the cable, and crimp a terminal.

Figure 3-15 Preparing a cable terminal outside the cabinet



NOTE

Choose an appropriate cabling route based on the actual situation. The figure is for reference only.

Step 4 Connect the cable with a crimped terminal to the corresponding copper bar.

Step 5 Clean foreign matter inside the cabinet.

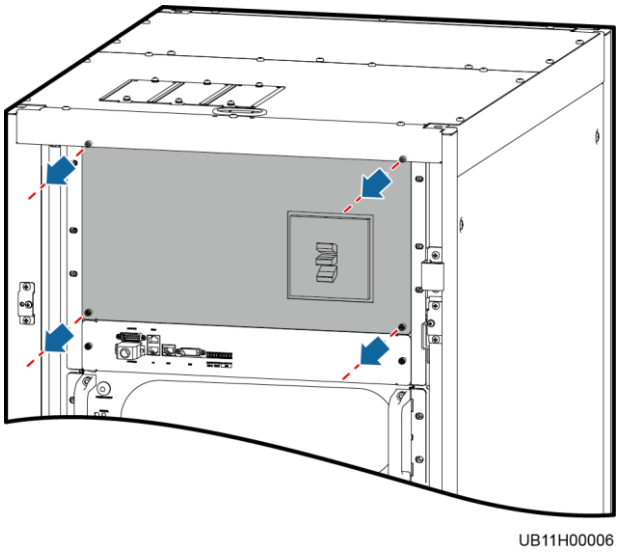
----End

3.2.3.2 Installing a PE Cable

Procedure

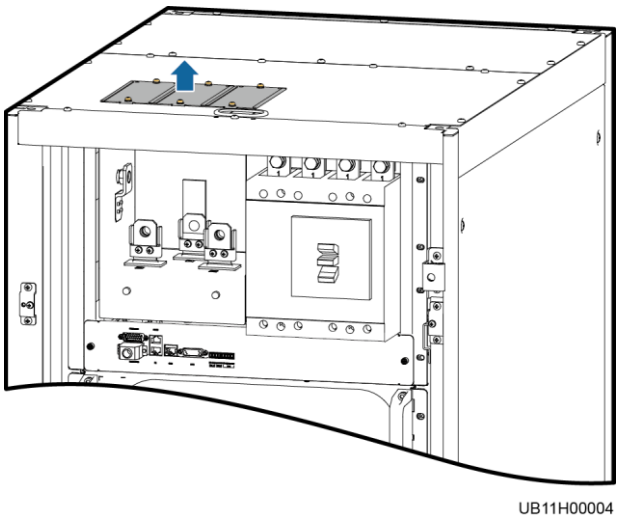
Step 1 Remove the cover from the PDU.

Figure 3-16 Removing the cover from the PDU



Step 2 Remove the top cover from the cabinet based on cable routes and dimensions.

Figure 3-17 Removing the top cover

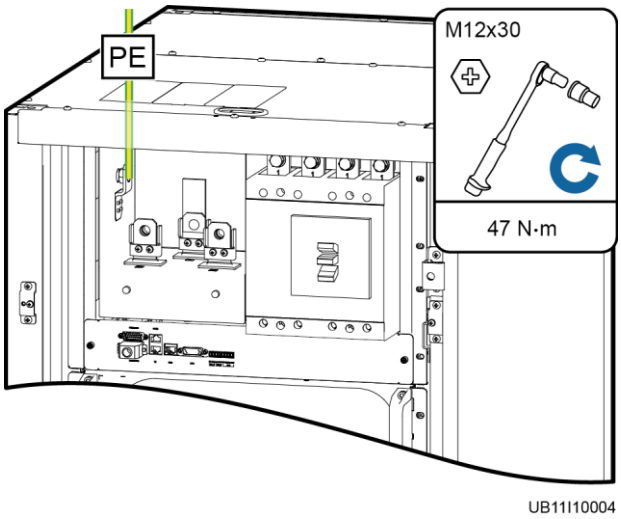


Step 3 Install a PE cable.

NOTE

The 70 mm^2 ground cable is recommended.

Figure 3-18 Installing a PE cable



----End

3.2.3.3 Installing Battery Modules and Cables

Context

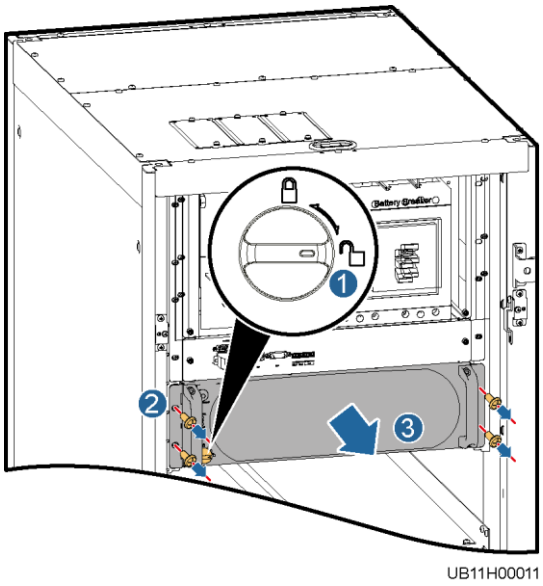
DANGER

- Before installing batteries, carefully read the battery safety precautions.
- During installation, wear insulation gloves and use insulated tools.
- Place the batteries correctly to prevent vibrations and shocks.
- Install the battery modules from bottom to top and from left to right to prevent falling over due to imbalance.
- Two persons are required to install the battery modules.

Procedure

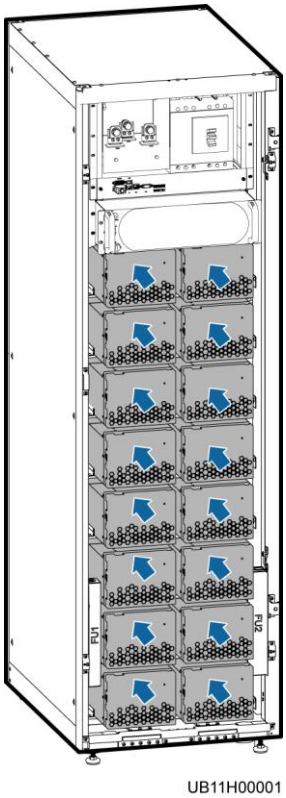
Step 1 Pull out the battery control unit for about 10 cm.

Figure 3-19 Pulling out the battery control unit



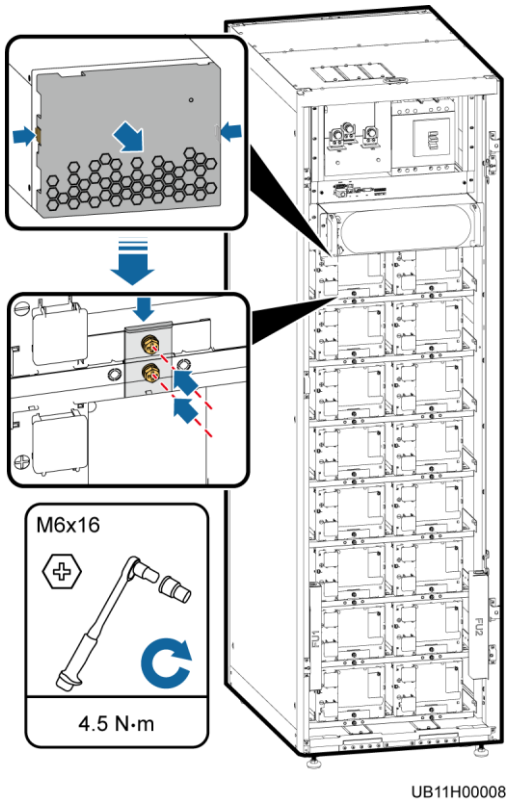
Step 2 Install battery modules.

Figure 3-20 Installing battery modules



Step 3 Remove front cover from the battery module, and install battery baffle plates.

Figure 3-21 Installing battery baffle plates



NOTE

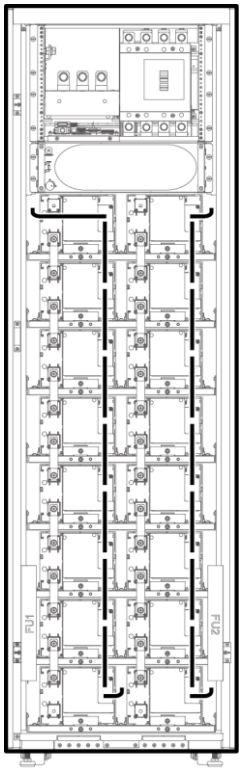
Place the front cover properly to prevent the light pipe from falling off.

Step 4 Install battery communications cables.

NOTICE

- Connect cables between the battery modules and then connect the cables to the battery control unit.
- Communications cables between the battery modules and the battery control unit are preinstalled inside the cabinet.

Figure 3-22 Installing battery communications cables

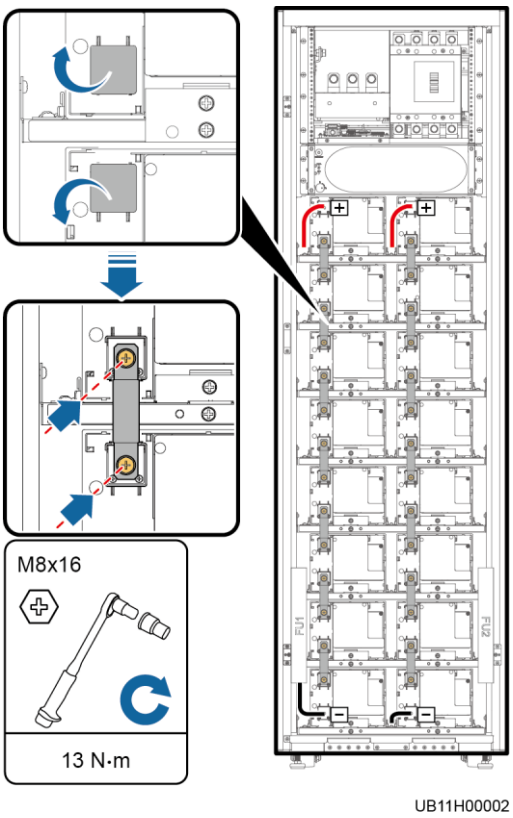


Step 5 Open the battery terminal protective cover and install battery copper bars and cables.

NOTICE

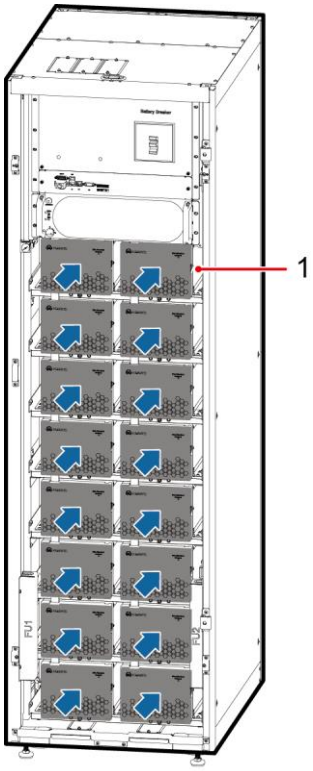
- Install copper bars between the battery modules, and then install cables between the battery modules and the battery control unit.
- Connect the round hole of the copper bar to the upper battery module, and then connect the waist hole of the copper bar to the lower battery module.
- After the copper bar on each terminal is secured, reinstall the protective cover on the terminal.
- Battery cables are preinstalled inside the cabinet.
- Excessive bolts will be used as spare parts.

Figure 3-23 Installing copper bars and cables



Step 6 Reinstall the front cover for the battery module.

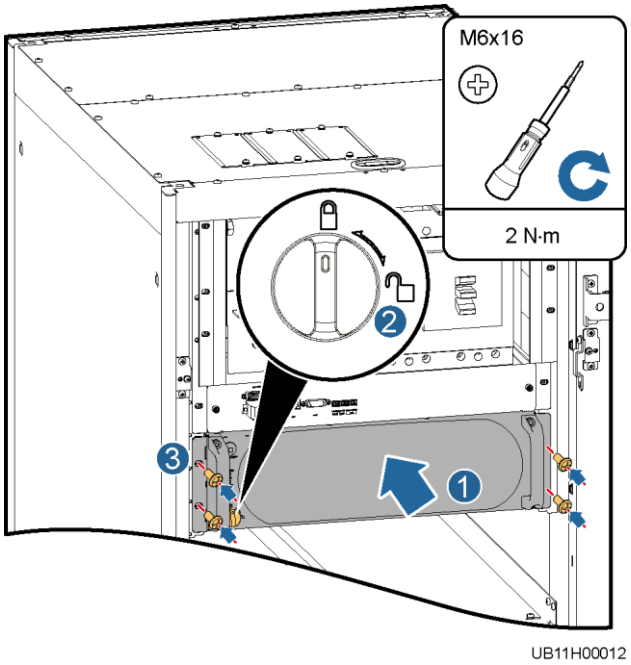
Figure 3-24 Reinstalling the front cover for the battery module



(1) When reinstalling the front cover, place the cables at the notches and ensure that the front cover does not press the cables.

Step 7 Reinstall the battery control unit.

Figure 3-25 Installing the battery control unit



----End

3.2.3.4 Remote EPO

NOTICE

- Huawei does not provide the EPO switch or cable. If the cable is required, the recommended cable is 22 AWG.
- Equip the EPO switch with a protective cover to prevent misoperations, and cover the cable with protective tubing.

Connect the EPO button to the EPO port on the SmartLi using the cable.

Figure 3-26 Cable connection for an NO EPO switch

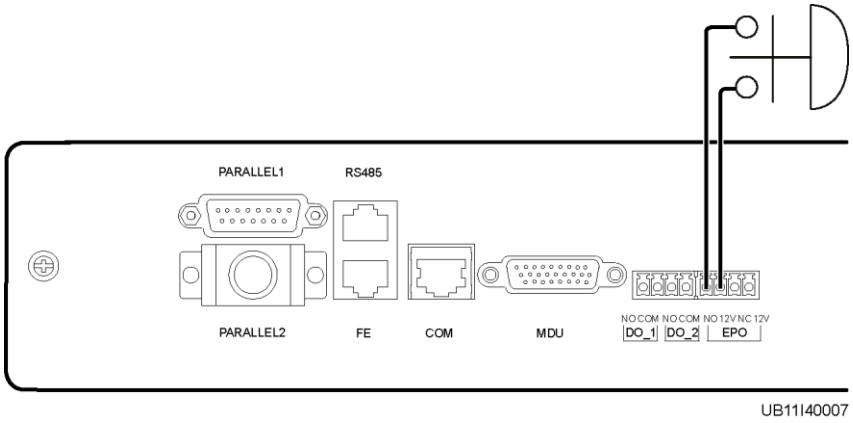
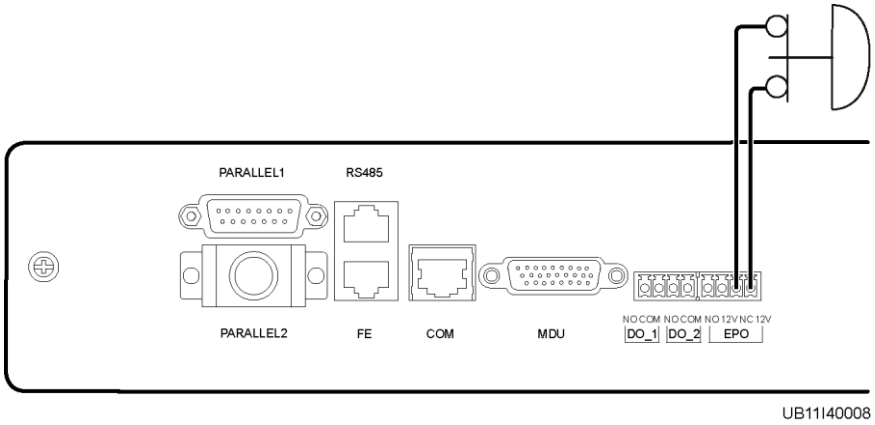


Figure 3-27 Cable connection for an NC EPO switch



NOTE

- When the EPO switch is in the NC state, remove the jumper between EPO_NC and EPO_12V before connection. When the EPO switch is turned off, EPO is triggered.
- When the EPO switch is in the NO state, ensure that the jumper is connected between EPO_NC and EPO_12V. When the EPO switch is turned on, EPO is triggered.

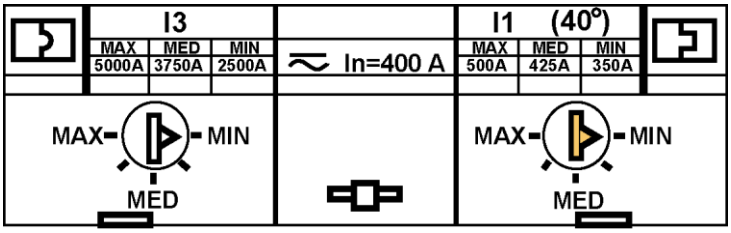
3.2.3.5 Installing Output Power Cables

Context

NOTICE

- Cables are routed from inside out.
- After routing cables, use sealing putty to seal the gaps between the cables and the cabinets.
- If the load of a single battery cabinet is less than or equal to 150 kW, you are advised to set the I1 value of the battery circuit breaker to the MIN value shown in the figure and use cables with a cross-sectional area of 120 mm^2 or larger. If the load of a single battery cabinet is greater than 150 kW, you are advised to use cables with a cross-sectional area of 150 mm^2 or larger.

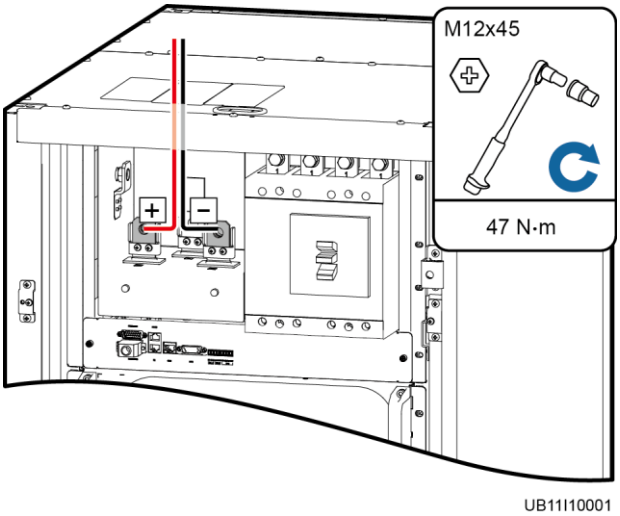
Figure 3-28 Setting I1 to the MIN value



Procedure

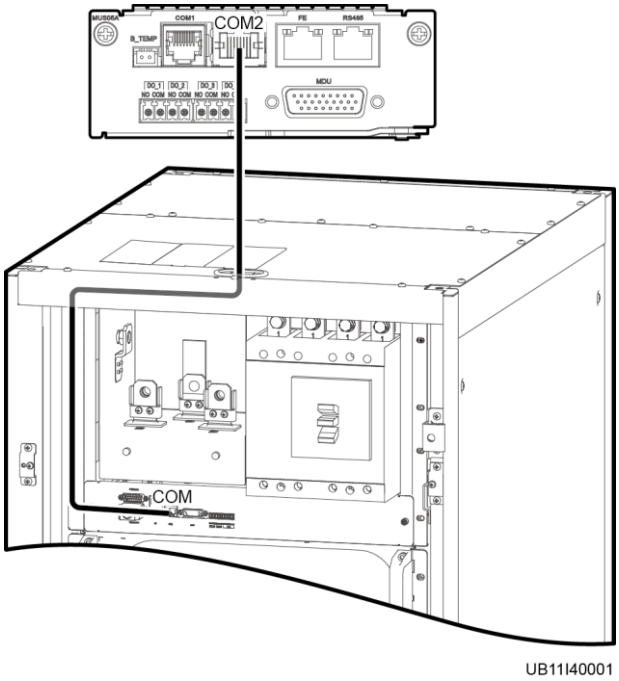
Step 1 Install power cables.

Figure 3-29 Installing power cables



Step 2 Install a communications cable to the UPS.

Figure 3-30 Installing a communications cable



----End

3.3 Combining Cabinets

Prerequisites

NOTICE

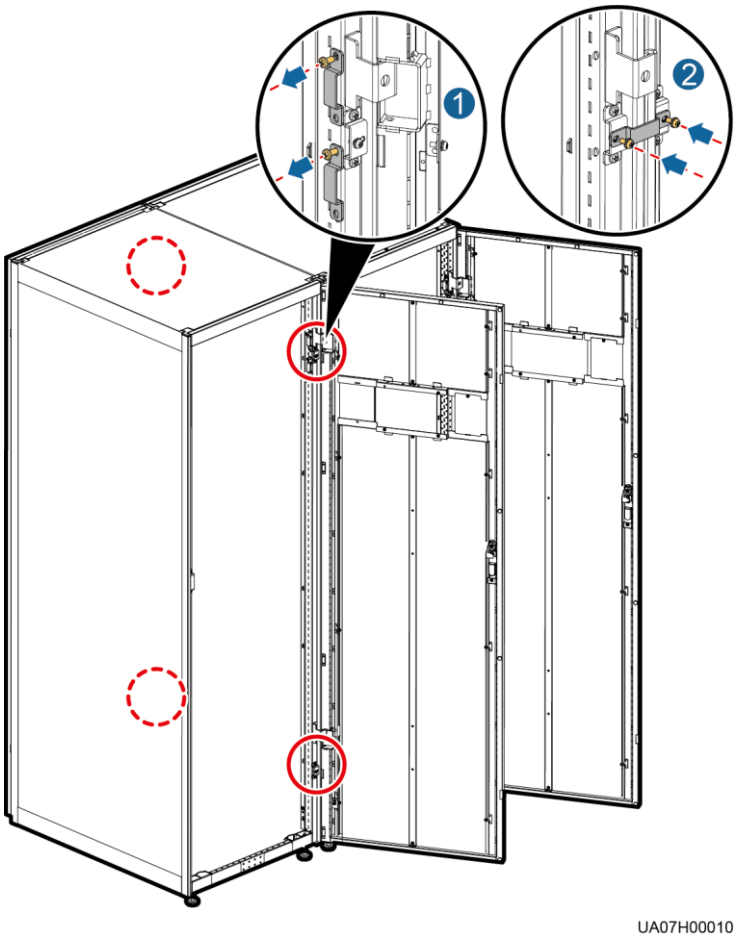
- The SmartLi supports the combination of up to five cabinets.
- When multiple cabinets are connected in parallel, only the basic cabinet has an LCD.
- When cabinets are combined, a battery bus bar box (BBB box) is required. For details about how to install a BBB box, see *PDU8000-(0630, 1250, 2000) DCV8-BGA001 BBB Box User Manual*.

Procedure

Step 1 Install each cabinet in sequence according to the installation method of a single cabinet.

Step 2 Combine cabinets.

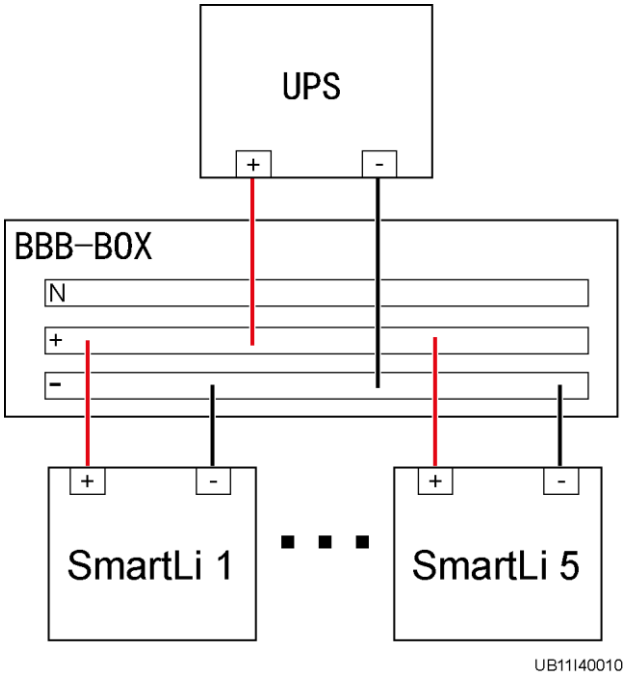
Figure 3-31 Installing connecting kits



Step 3 Install a PE cable for each cabinet.

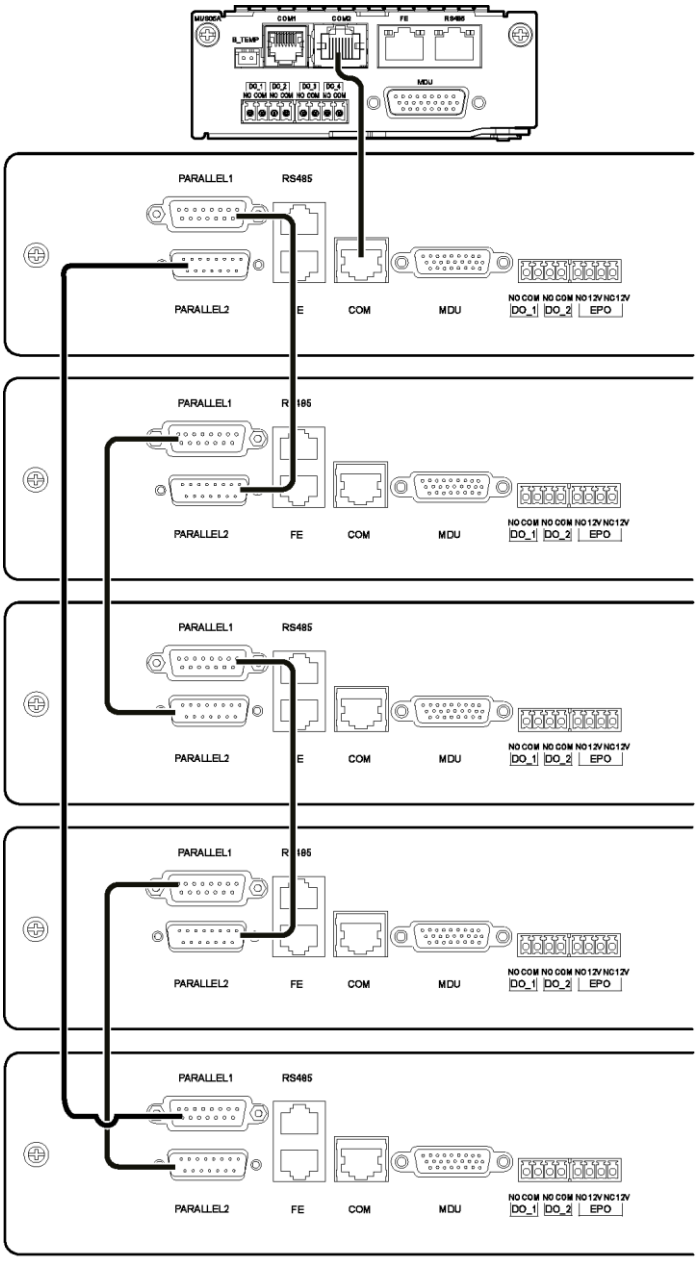
Step 4 Connect battery cables.

Figure 3-32 Connecting battery cables



Step 5 Connect communications cables.

Figure 3-33 Connecting communications cables



NOTE

The numbers of cabinets in a parallel system depend on the connection of communications cables. After the communications cables are connected according to the preceding figure, the cabinets are numbered 1, 2, 3, 4, and 5 from top to bottom.

----End

3.4 Installation Verification

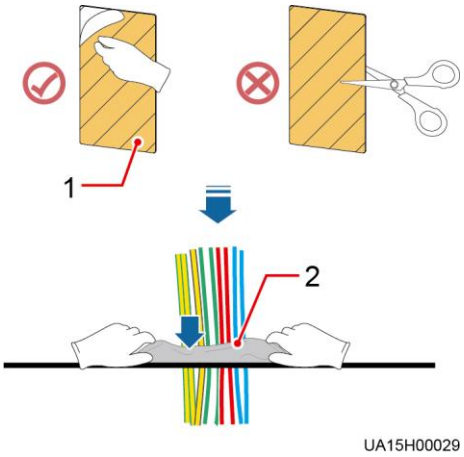
Table 3-2 Installation checklist

No.	Item	Acceptance Criteria
01	SmartLi installation	The SmartLi is securely installed and does not tilt due to vibration.
02	Neat arrangement	The SmartLi and its adjacent cabinets are neatly arranged and secured with connecting plates.
03	Cable layout	Cables are routed properly and cable routing meets customer requirements.
04	Cable labels	Both ends of a cable are labeled. Labels are concise and easy to understand.
05	Cable ties	Cable ties are secured evenly and no burr exists.
06	Cable connections	The output, and battery cables are securely connected. For the cables secured by screws, the spring washers are flattened.
07	Grounding	The resistance between the SmartLi ground bar and the equipment room ground bar is less than 0.1 ohm.
09	Battery cable connections	The SmartLi is correctly connected to the UPS.
10	Checking the pressure gauge	Check whether the pressure gauge pointer is in the green zone and whether the pressure value is greater than 1.6 MPa at 20°C.
11	Foreign matter cleaning inside the cabinet	The inside and outside of the cabinet, and other operating components, are free from conductive dust. 1. There is no foreign matter (such as copper wires and screws) on the top of the cabinet. 2. There is no foreign matter on the copper bar terminals. 3. There is no foreign matter around switch terminals. 4. There is no foreign matter on the bottom plate of the cabinet. 5. There is no foreign matter on the rear module subrack.

NOTE

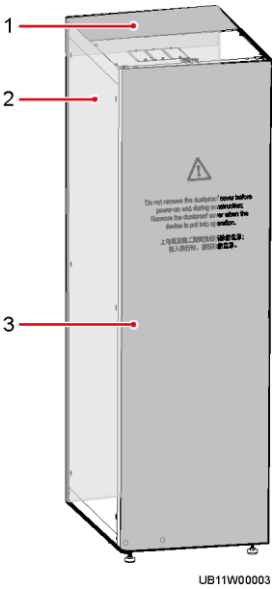
1. In the scenarios where covers are removed for routing cables, after routing cables and checking cable connections, use sealing putty to fill in the gap between the cables and the cabinet.
2. After verifying the installation, reinstall all the covers.
3. Do not remove the dustproof cover before power-on to prevent dust inside the UPS.

Figure 3-34 Fill the holes with sealing putty



(1) Paper protective film (2) Sealing putty

Figure 3-35 Dustproof cover



(1) Top dustproof cover (2) Rear dustproof cover (3) Front dustproof cover

4 User Interface

4.1 LCD Interface

4.1.1 Main Menu screen

NOTICE

User interfaces provided in this document correspond to the monitor display module (MDU) version V100R003C10B004SP00 and are for reference only.

The LCD screen is divided into three parts: status bar, alarm bar and information area.

Figure 4-1 Main menu screen

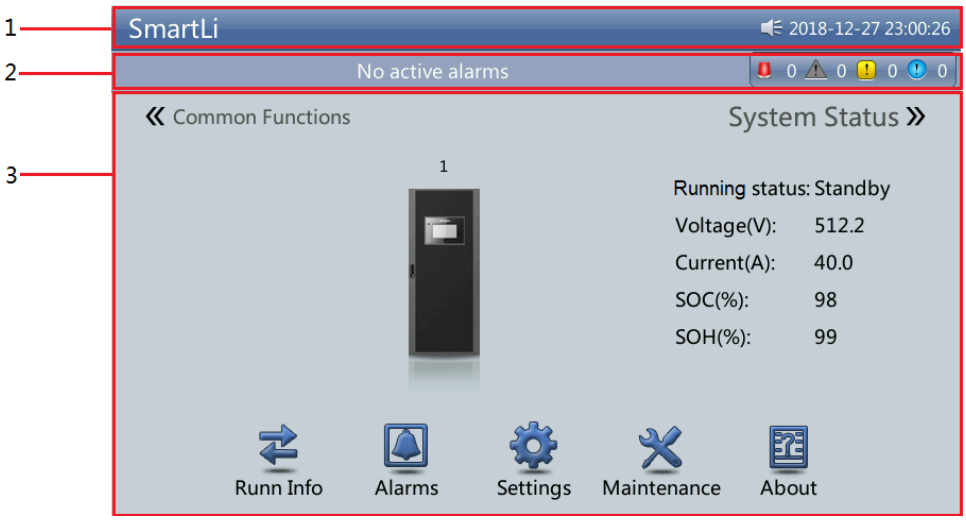


Table 4-1 Main menu screen description

Number	Area	Function
1	Status bar	Displays the SmartLi model, current date and time, USB

Number	Area	Function
		flash drive status, and buzzer status.
2	Alarm bar	Displays active alarms in a scrolling list and the number of active alarms based on severity. Tap the alarm icon area to open the active alarm page.
3	Information area	Displays system information.

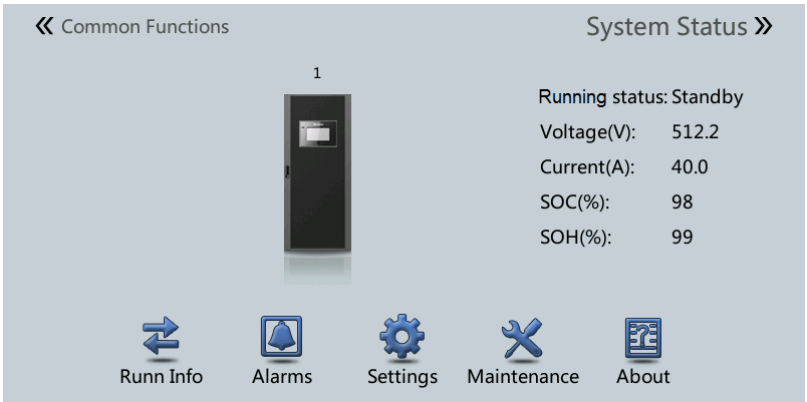
Table 4-2 Functions of common buttons

Button	Function
	Returns to the main screen.
	Scrolls the page down.
	Scrolls the page up.
	Returns to the upper-level menu.
	Logs a user out.

4.1.2 System Status

On the main menu screen, the **System Status** screen is displayed.

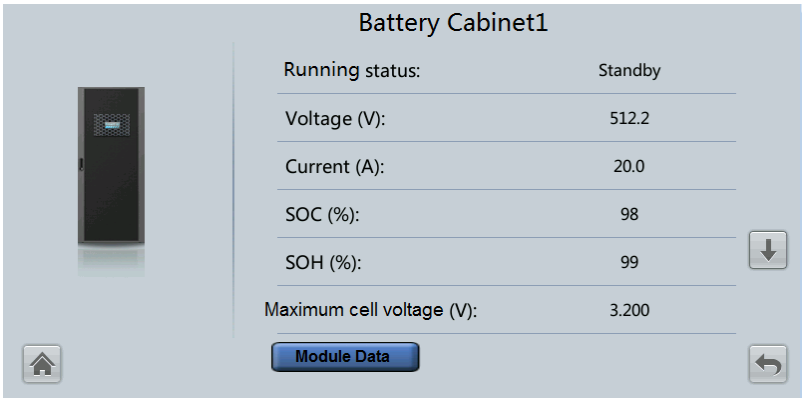
Figure 4-2 System status



4.1.2.1 Battery Cabinet

On the **System Status** screen, tap **Battery Cabinet**. You can view the battery cabinet and module information.

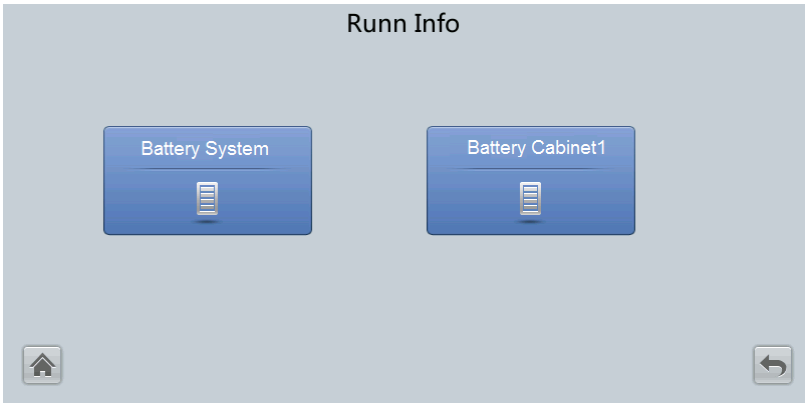
Figure 4-3 Rack



4.1.2.2 Runn Info

On the **System Status** screen, tap the **Runn Info** icon. You can query **Battery System** and **Battery Cabinet**.

Figure 4-4 Runn Info



Battery System

Item	Description
Running status	Battery system running status
Voltage (V)	Battery system output voltage
Current (A)	Battery system output current
SOC (%)	SOC value

Item	Description
SOH (%)	SOH value
Maximum cell voltage (V)	Highest battery cell voltage
Minimum cell voltage (V)	Lowest battery cell voltage
Maximum cell temperature (°C)	Highest battery cell temperature
Minimum cell temperature (°C)	Lowest battery cell temperature
Discharge times	Discharge times
Discharge capacity (Ah)	Discharge capacity

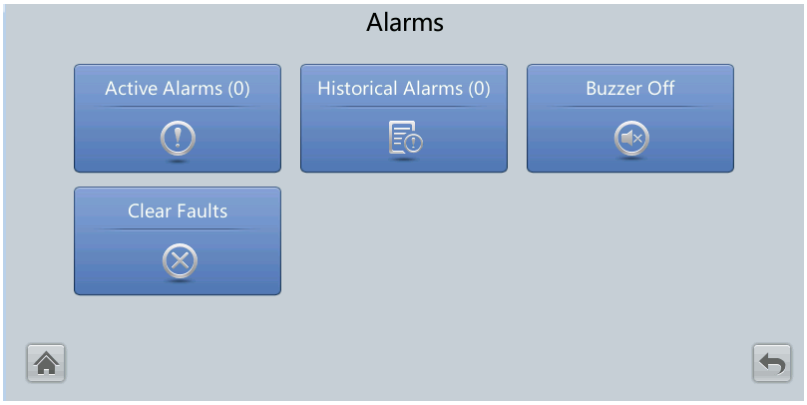
Battery Cabinet

Item	Description
Running status	Battery cabinet running status
Voltage (V)	Battery cabinet output voltage
Current (A)	Battery cabinet output current
SOC (%)	SOC value
SOH (%)	SOH value
Maximum cell voltage (V)	Highest battery cell voltage
Minimum cell voltage (V)	Lowest battery cell voltage
Maximum cell temperature (°C)	Highest battery cell temperature
Minimum cell temperature (°C)	Lowest battery cell temperature
Discharge times	Discharge times
Discharge capacity (Ah)	Discharge capacity

4.1.2.3 Alarms

On the **System Status** screen, tap the **Alarms** icon. You can query **Active Alarms** and **Historical Alarms** and perform **Buzzer Off** and **Clear Faults**.

Figure 4-5 Alarms



4.1.2.4 Settings

On the **System Status** screen, tap the **Settings** icon.

NOTE

If a user is not currently logged in, a dialog box will display for entering a user name and password.

Figure 4-6 Settings

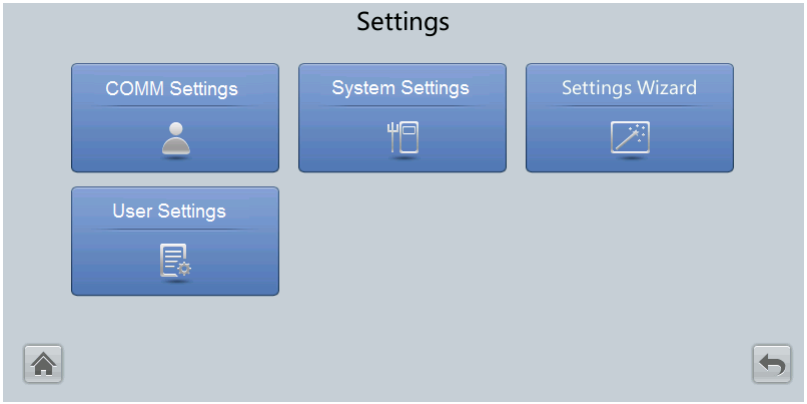


Table 4-3 COMM Settings

Item	Description	Default Value	Value Range
IP Address allocation	Specifies the IP address allocation.	Automatic	Manual, Automatic
IP address	Specifies the IP address for the Ethernet.	192.168.0.10	1.0.0.0–223.255.255.255
Subnet mask	Specifies the subnet mask of the Ethernet.	255.255.255.0	0.0.0.0–255.255.255.255
Gateway	Specifies the Ethernet gateway.	192.168.0.1	1.0.0.0–223.255.25

Item	Description	Default Value	Value Range
			5.255
RS485 port address	Specifies the address for RS485 communication.	1	1-254
RS485 port baud rate	Matches the user's network management conditions onsite.	9600	4800, 9600, 19200, 115200
COM port address	Specifies the address for COM communication.	80	1-254
COM port baud rate	Matches the user's network management conditions onsite.	9600	4800, 9600, 19200, 115200
ModbusTCP encryption	If Modbus TCP is used for communication, communication links do not implement encryption or implement encryption based on the selected encryption mode.	Disable	Disable, Enable

IP address allocation

- If the MDU is directly connected to a computer, the IP address can only be allocated manually. The IP addresses of the MDU and computer must be in the same network segment, and must be different.
- If the MDU is connected to a computer through a LAN switch or router with the DHCP function, the IP address can be allocated manually or automatically. Manual allocation is used by default.
  - **Manual**: Check that their IP addresses are two different values on the same network segment. Set the SmartLi IP address to be in the same subnet as the PC IP address. Perform the bitwise AND operation for the UPS IP address and the PC IP address with the subnet mask respectively. If the operation results are the same, the two IP addresses are in the same subnet.

    AND operation rule: 1 AND 1 = 1, 1 AND 0 = 0, 0 AND 1 = 0, 0 AND 0 = 0. That is when the corresponding bits are both 1, the result is 1. In other cases, the result is 0.

Table 4-4 Bitwise AND operation example

-	PC IP address (182.98.225.125)	UPS IP address (182.98.225.112)
PC IP address/SmartLi IP address	10110110.01100010.11100001.01111101	10110110.01100010.11100001.01110000
Subnet mask (255.255.255.192)	11111111.11111111.11111111.11000000	11111111.11111111.11111111.11000000
Bitwise AND operation result	10110110.01100010.11100001.01000000	10110110.01100010.11100001.01000000

- **Automatic**: The MDU automatically searches for available IP addresses in the connected network. Ensure that the MDU and PC are on the same network segment.

NOTE

- After you restart the device, **IP address allocation** changes back to **Manual**. The IP address is set to the IP address set previously.
- Ensure that the SmartLi IP address is unique on the network segment. Otherwise, the WebUI display function may not function properly.

Table 4-5 System Settings

Item	Description	Default Value	Value Range
Battery cabinet quantity	Specifies the total number of combined cabinets.	1	1–12

Table 4-6 Settings Wizard

Item	Parameter	Description
Language	English, Chinese	Set based on site requirements.
Time	Date format, YYYY-MM-DD, Time zone, Time	Set based on site requirements.
Network Param.	IP Address allocation, IP address, Subnet mask, Gateway	Set based on site requirements.
System Param.	Battery cabinet quantity	Set based on site requirements.

Table 4-7 User Settings

Item	Description	Default Value	Value Range
Language	Two languages are supported.	English	English, Chinese
Date format	Specifies the date format.	N/A	N/A
YYYY-MM-DD	Set based on site requirements.	N/A	N/A
Time zone	Set based on site requirements.	N/A	N/A
Time	Set based on site requirements.	N/A	N/A
Password	The password can be changed.	000001	N/A
Contrast	Set based on actual requirements.	6	N/A

Item	Description	Default Value	Value Range
Brightness	Set based on actual requirements.	8	N/A
Saturation	Set based on actual requirements.	8	N/A

4.1.2.5 Maintenance

On the **System Status** screen, tap the **Maintenance** icon.

NOTE

If a user is not currently logged in, a dialog box will display for entering a user name and password.

Figure 4-7 Maintenance

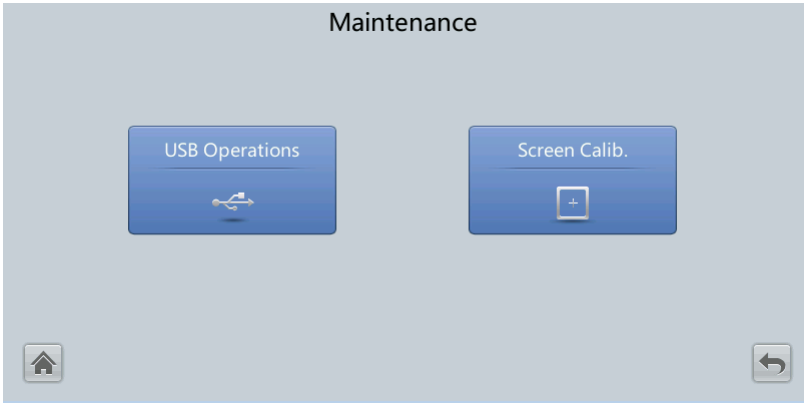
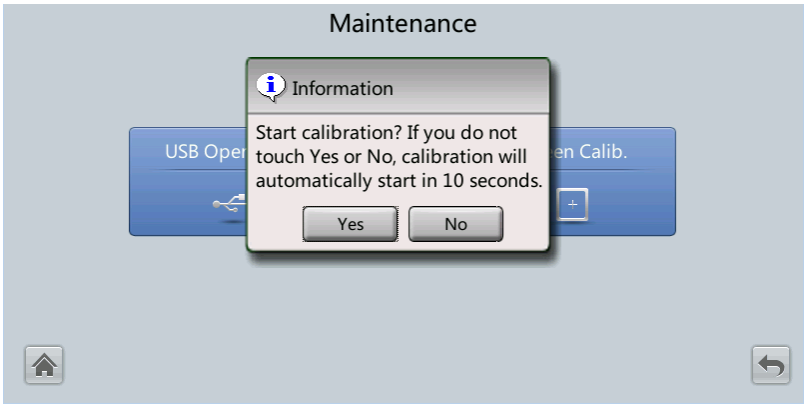


Figure 4-8 USB Operations 1

Figure 4-9 USB Operations 2

Screen Calib.

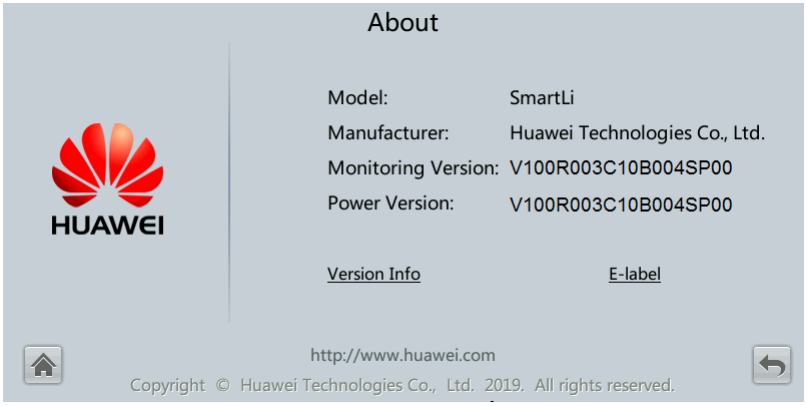
Figure 4-10 Screen Calib.



4.1.2.6 About

On the **System Status** screen, tap **About**. You can view **Model**, **Manufacturer**, and **Product Version**.

Figure 4-11 About



4.1.3 Common Functions

On the main menu screen, choose **Common Functions**. You can query **Buzzer Off** and **Historical Alarm**.

Figure 4-12 Common Functions

4.2 WebUI

4.2.1 Login

Context

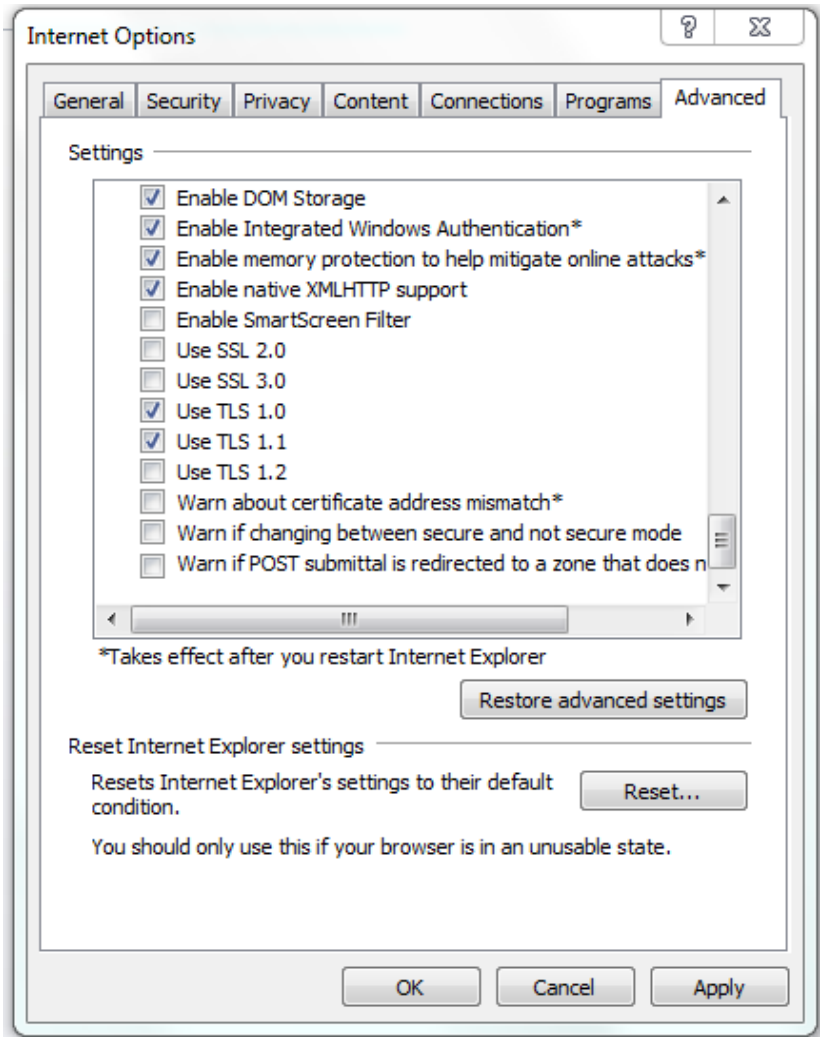
Internet Explorer 11 is used as the example browser.

Procedure

Step 1 Open the browser and choose **Tools** > **Internet Options**

Step 2 On the **Advanced** tab page, ensure that **Use TLS 1.0**, and **Use TLS 1.1** are selected and click **OK**.

Figure 4-13 Settings in the Internet Options dialog box



Step 3 Enter **https://SmartLi IP address** in the address box of the browser, select a language, set **User name** and **Password**, and click **Login**. The system supports Internet Explorer 11 and Firefox 31.0.

NOTE

The preset SmartLi IP address is 192.168.0.10. You can set the SmartLi Ethernet IP address on the LCD or WebUI. The value range is 1.0.0.0–223.255.255.255.

Table 4-8 User description

Default User	Preset Password		User Rights
admin (system administrator)	LCD	000001	Performs all operations on the LCD and WebUI, including system running information browsing, system information (historical alarms, logs, e-labels, and fault information) exporting, parameter setting, system control, system configuration (network parameters, user management, time and date, and site
	WEB	Changeme	

Default User	Preset Password		User Rights
			information), and system maintenance.
operator (common user)	LCD	000001	Only browses the system running information, exports system information (historical alarms, logs, e-labels, and fault information), starts/shuts down the inverter, rectifies faults, and controls the buzzer. Other control and maintenance functions that may affect system operation are invisible and parameters cannot be set.
	WEB	Changeme	
browser (browsing user)	WEB	-	Only browses the system running information.

NOTE

- If an incorrect password is entered three consecutive times, the account will be logged out for 5 minutes.
- After a user logs in to the WebUI, if another user logs in with the same user name, the current account will be logged out.
- It is advised to change the password after the first login using **User Management** on the **Maintenance** page to prevent unauthorized access.

----End

4.2.2 Home

The **Home** page displays **System Status**, **Active Alarm**, and others.

Figure 4-14 Home

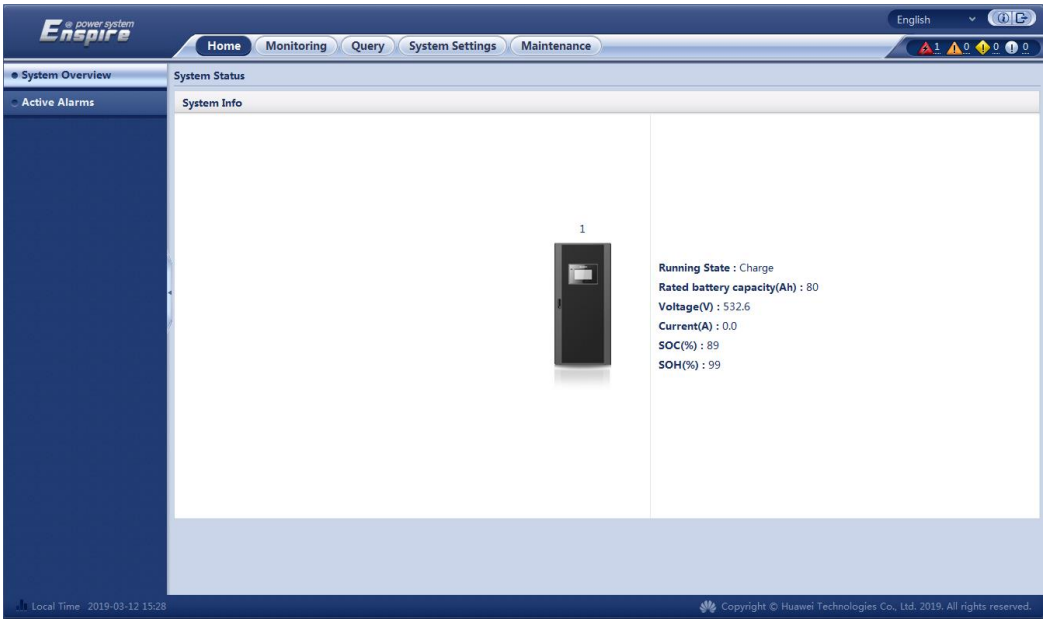


Figure 4-15 System Status

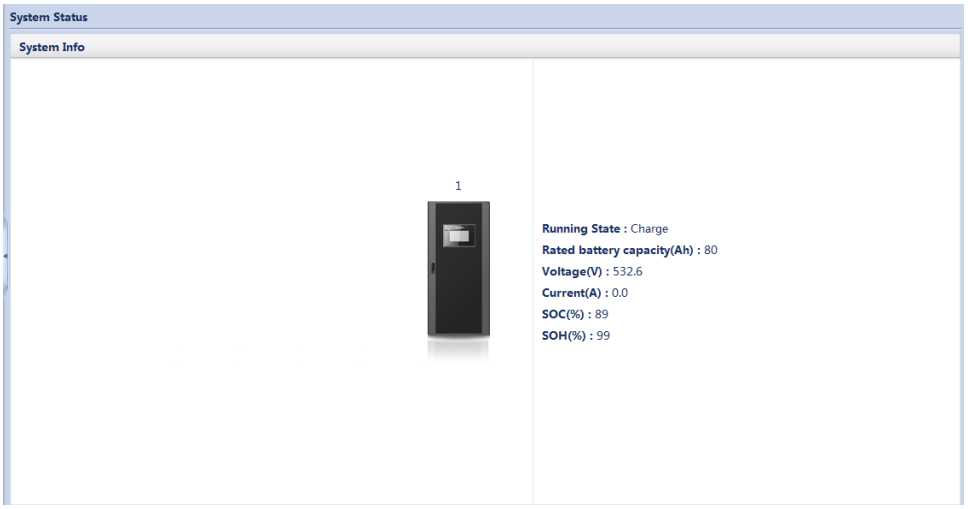
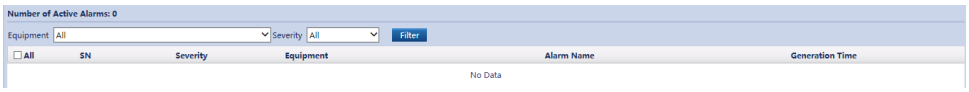


Figure 4-16 Active Alarm



4.2.3 Monitoring

On the home page, choose the **Monitoring** tab. The real-time monitoring tab displays the running information of **Battery System**, **Battery Cabinet**, and **Battery Module**.

Figure 4-17 Monitoring

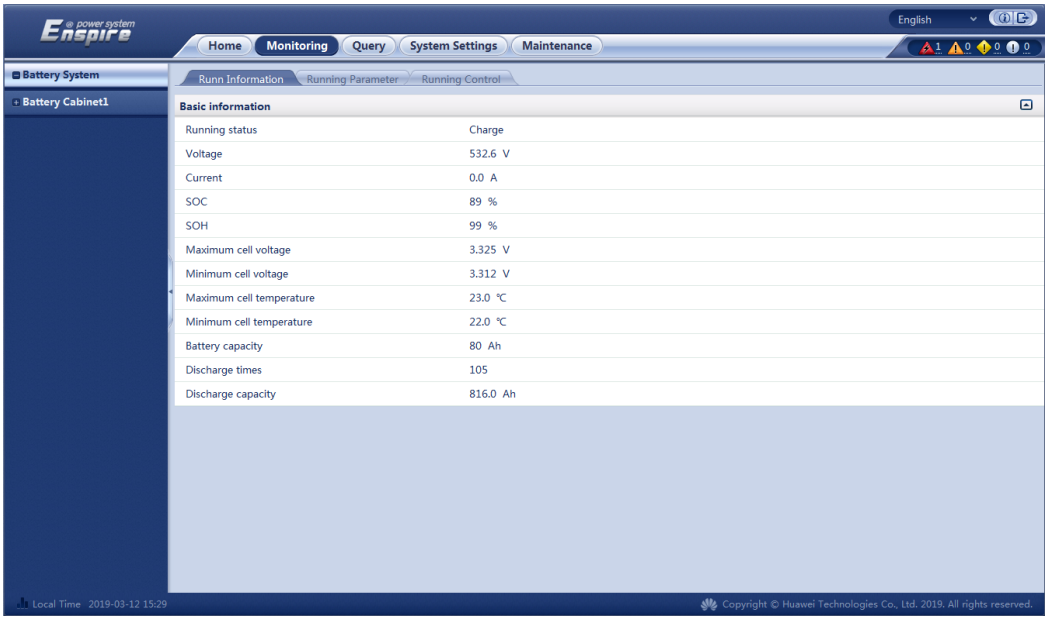


Figure 4-18 Battery System

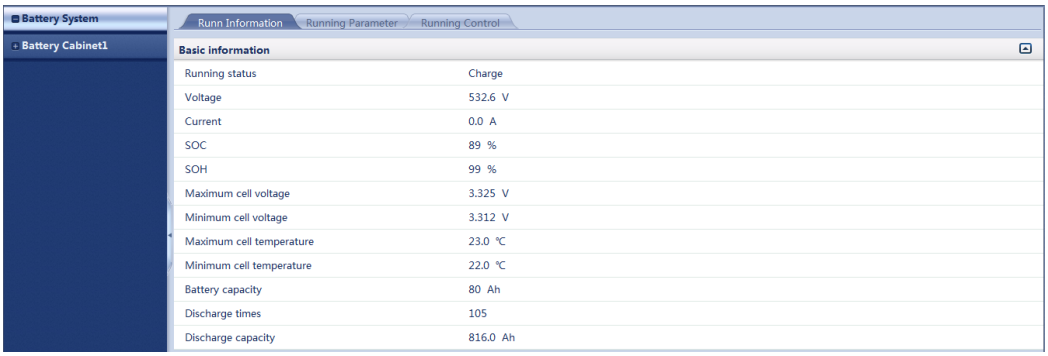


Figure 4-19 Battery Cabinet

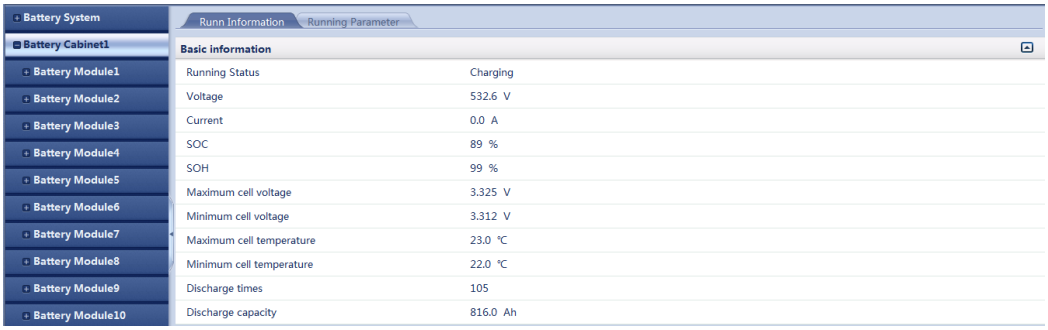
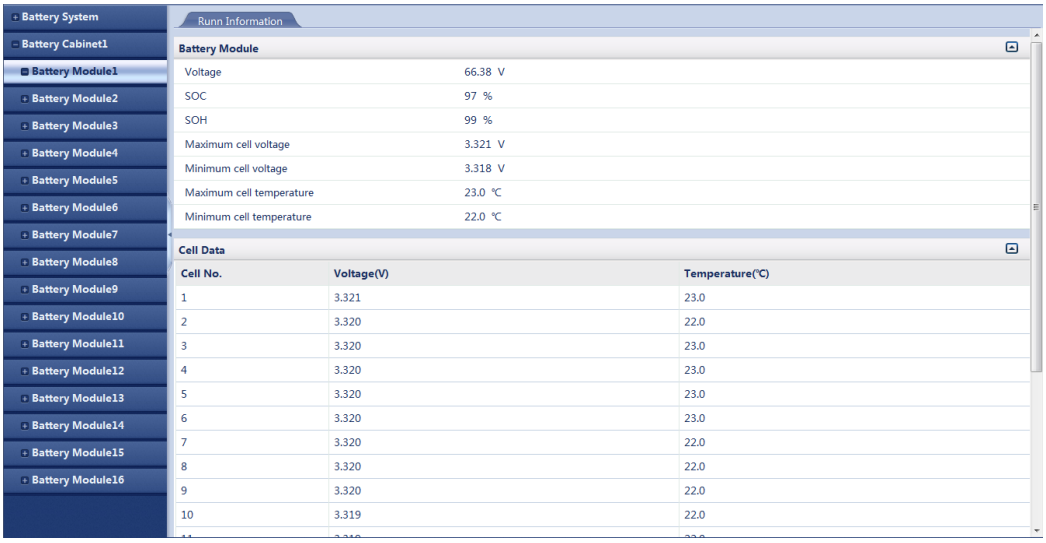


Figure 4-20 Battery Module



4.2.4 Query

On the home page, choose the **Query** tab. The historical queries include **Historical Alarm**, **Performance Data**, **Operation Log**, and **Export Historical Data**.

Figure 4-21 Query

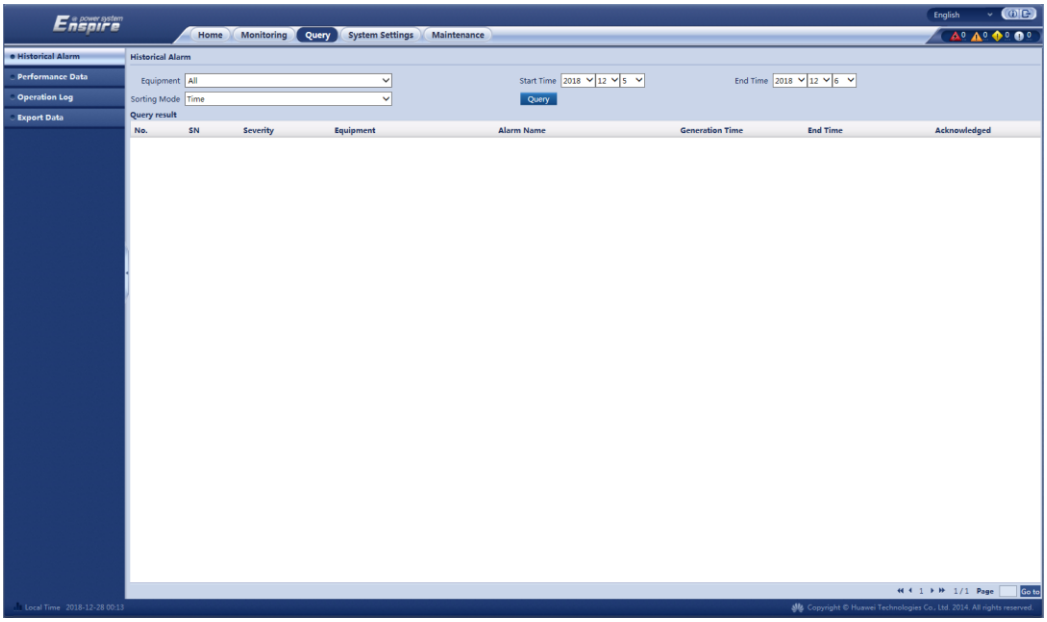


Figure 4-22 Historical Alarm

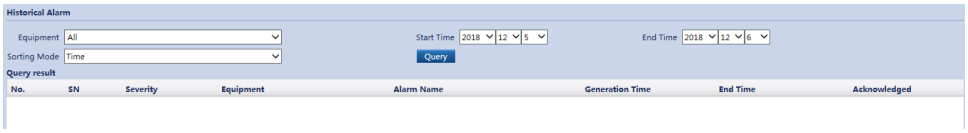


Figure 4-23 Performance Data

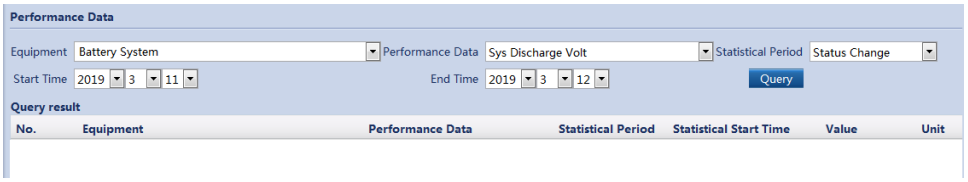


Figure 4-24 Operation Log

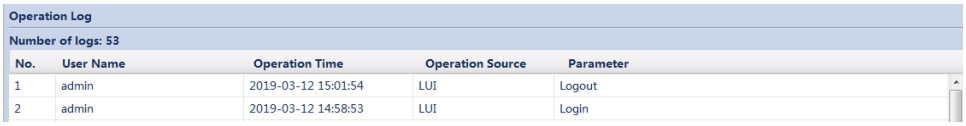
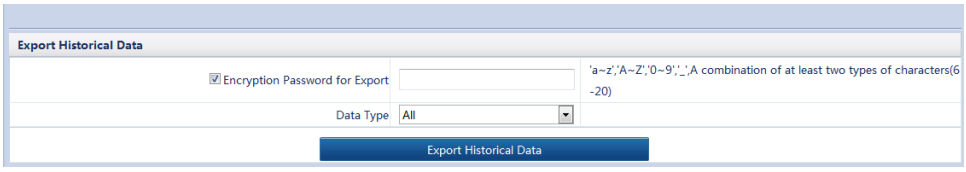


Figure 4-25 Export Historical Data



4.2.5 System Settings

On the home page, choose the **System Settings** tab. The system settings include **Site Configuration**, **Time**, **IP Address**, **Configuration File**, and **SNMP**.

Figure 4-26 System Settings

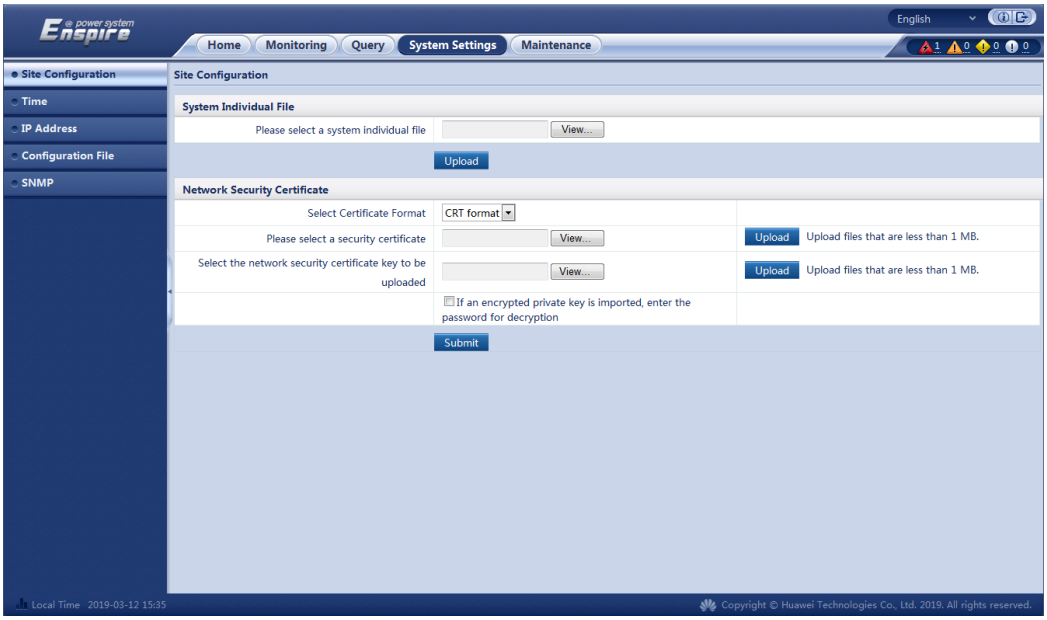


Figure 4-27 Site Configuration

Figure 4-28 Time

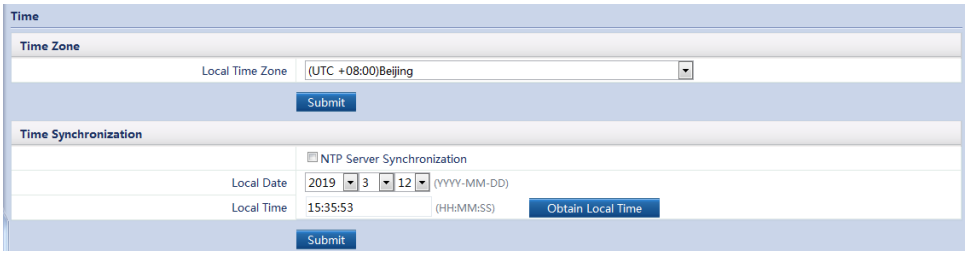


Figure 4-29 IP Address

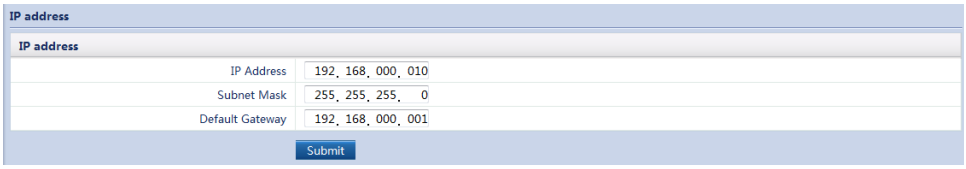


Figure 4-30 Configuration File

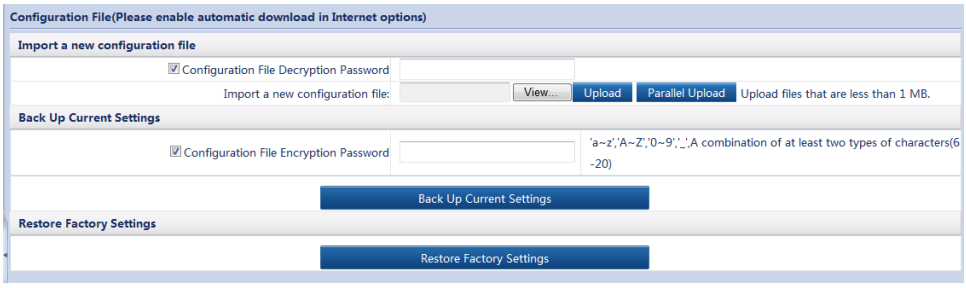
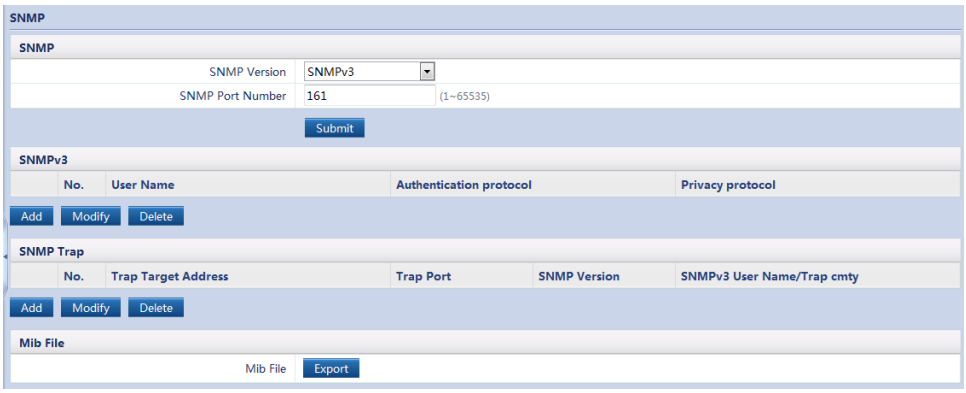


Figure 4-31 SNMP



4.2.6 Maintenance

NOTE

Non-professional engineers should exercise caution when operating the maintenance page.

On the homepage, choose the **Maintenance** tab. The maintenance functions include **Software Upgrade**, **Version Information**, **E-Label**, **User Management**, and **Fault Information**.

Figure 4-32 Maintenance

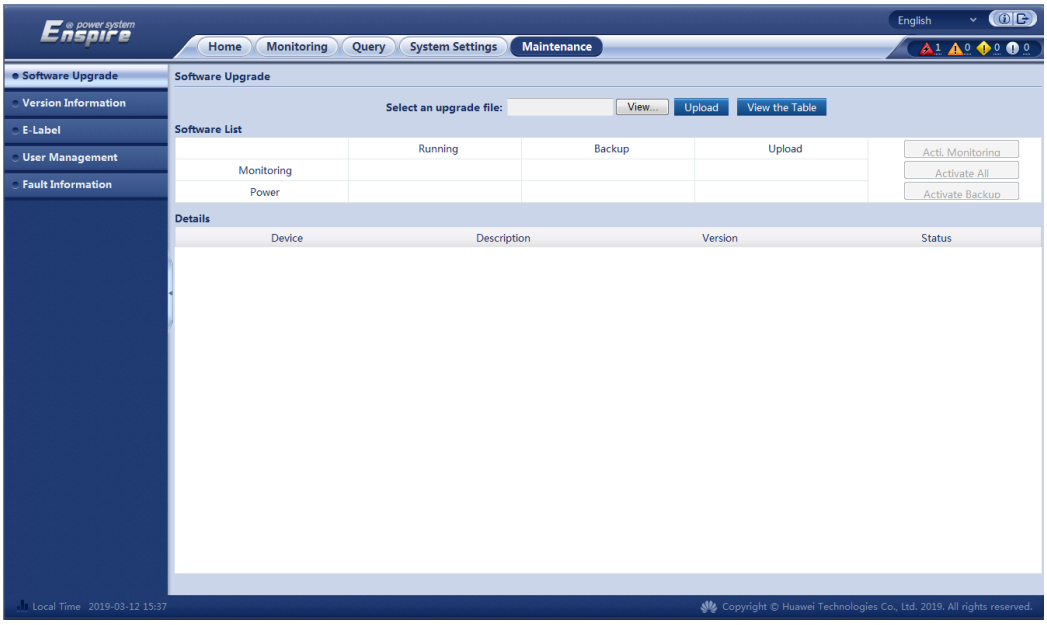


Figure 4-33 Software Upgrade

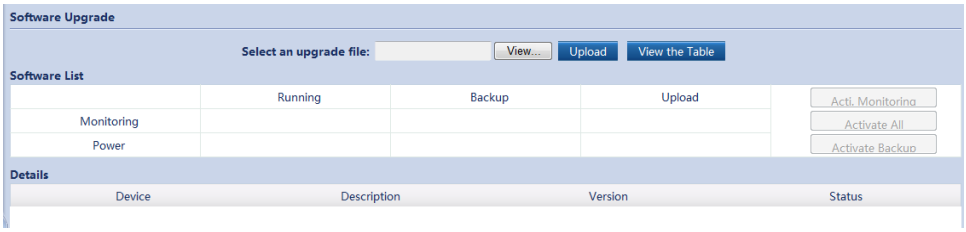
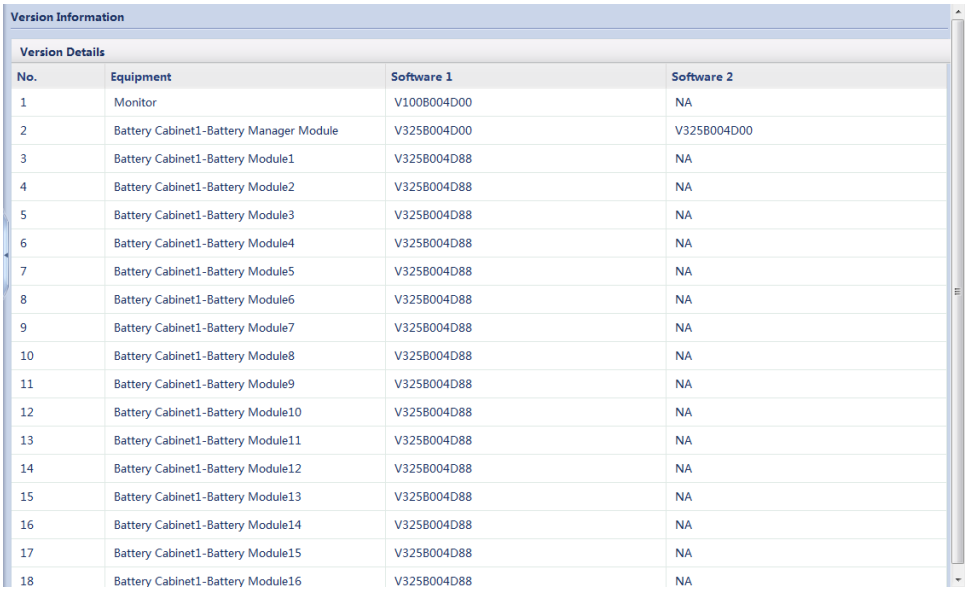


Figure 4-34 Version Information

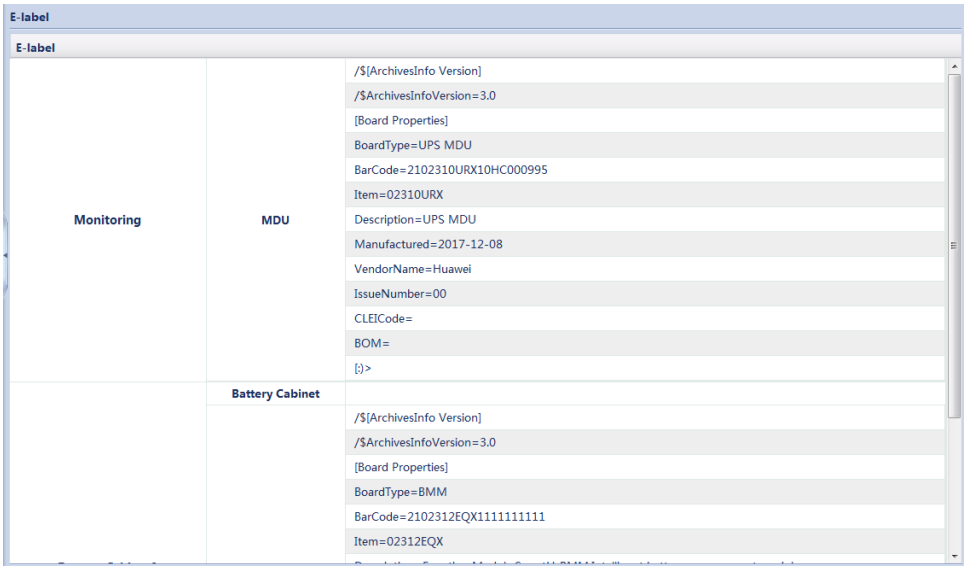


Version Information

Version Details

No.	Equipment	Software 1	Software 2
1	Monitor	V100B004D00	NA
2	Battery Cabinet1-Battery Manager Module	V325B004D00	V325B004D00
3	Battery Cabinet1-Battery Module1	V325B004D88	NA
4	Battery Cabinet1-Battery Module2	V325B004D88	NA
5	Battery Cabinet1-Battery Module3	V325B004D88	NA
6	Battery Cabinet1-Battery Module4	V325B004D88	NA
7	Battery Cabinet1-Battery Module5	V325B004D88	NA
8	Battery Cabinet1-Battery Module6	V325B004D88	NA
9	Battery Cabinet1-Battery Module7	V325B004D88	NA
10	Battery Cabinet1-Battery Module8	V325B004D88	NA
11	Battery Cabinet1-Battery Module9	V325B004D88	NA
12	Battery Cabinet1-Battery Module10	V325B004D88	NA
13	Battery Cabinet1-Battery Module11	V325B004D88	NA
14	Battery Cabinet1-Battery Module12	V325B004D88	NA
15	Battery Cabinet1-Battery Module13	V325B004D88	NA
16	Battery Cabinet1-Battery Module14	V325B004D88	NA
17	Battery Cabinet1-Battery Module15	V325B004D88	NA
18	Battery Cabinet1-Battery Module16	V325B004D88	NA

Figure 4-35 E-Label



E-label

E-label

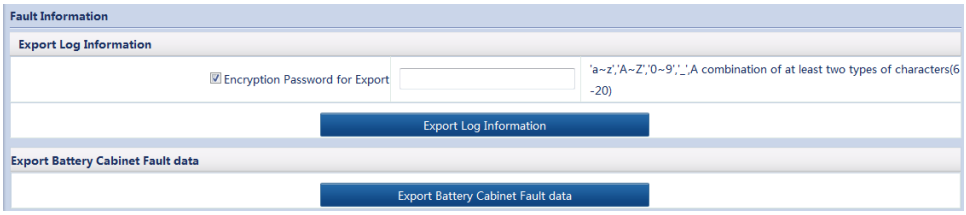
Monitoring	MDU	/$[ArchivesInfo Version]
		/$ArchivesInfoVersion=3.0
		[Board Properties]
		BoardType=UPS MDU
		BarCode=2102310URX10HC000995
		Item=02310URX
		Description=UPS MDU
		Manufactured=2017-12-08
		VendorName=Huawei
		IssueNumber=00
		CLEICode=
		BOM=
		[:)>
	Battery Cabinet	
		/$[ArchivesInfo Version]
		/$ArchivesInfoVersion=3.0
		[Board Properties]
		BoardType=BMM
		BarCode=2102312EQX1111111111
		Item=02312EQX

Figure 4-36 User Management

User Management

Select	User Name	Authority	Online Status	Login Source
	admin	Administrator	Offline	LUI
	operator	Operator	Offline	LUI
	admin	Administrator	WEB Online	WEB
	operator	Operator	Offline	WEB

Figure 4-37 Fault Information



5 Operations

5.1 Powering On Batteries

Prerequisites

Turn on the ready switch on the battery control unit.

Procedure

Step 1 On the UPS LCD screen:

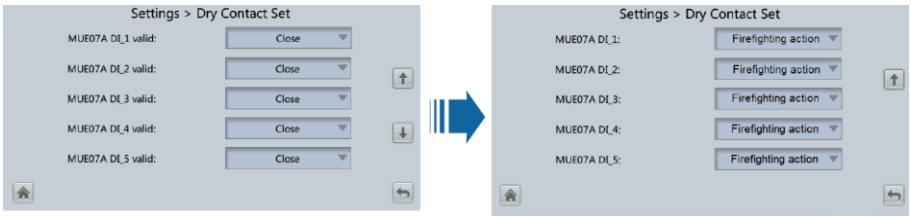
1. Set **System Info** > **Settings** > **Battery Settings** > **Battery Type** to **Lithium battery**.

NOTICE

- Upgrade the UPS software to the version that supports lithium battery connection. See *UPS5000 The Relationship of Software Version* to check the version number.
- **Thres. of low batt. volt. over dry contact (V/cell)**: If you set **Batt. Volt. Below Threshold** for an output dry contact and the battery voltage is lower than this threshold, the output dry contact will output signals accordingly.

2. Choose **System Info > Settings > Dry Contact Set**, set **MUE07A DI_1 valid-MUE07A DI_5 valid** to **Close**, and set **MUE07A DI_1-MUE07A DI_5** to **Firefighting action**.

Figure 5-1 Dry contact settings



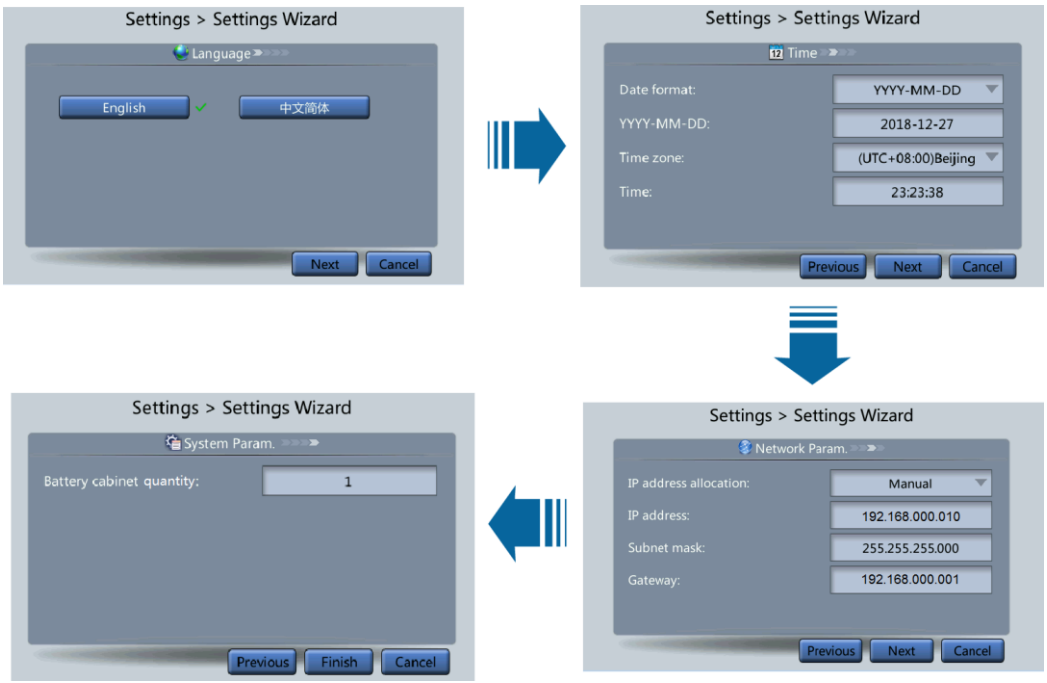
Step 2 Press and hold the POWER ON/OFF button on the battery control unit for more than 2s. The green indicator of the battery control unit blinks at 4 Hz.

NOTICE

- The **BCB off** alarm is displayed on the UPS LCD and SmartLi LCD. No action is required. After the battery circuit breaker is closed, the alarm is automatically cleared.
- After the battery control unit is started, the green indicator is on for 1s and then off for 4s, and the red indicator is steady on.
- If multiple SmartLi cabinets are combined, press and hold the POWER ON/OFF button on each battery control unit of the cabinets one by one for more than 2s.

Step 3 Set the language, time, date, network parameters, and system parameters on the **Settings Wizard** screen

Figure 5-2 Settings wizard



NOTE

In a parallel system, **Battery cabinet quantity** indicates the total number of battery cabinets.

Step 4 After the green indicator of the battery control unit blinks at 10 Hz, turn on the battery circuit breaker on the SmartLi.

NOTICE

- If the green indicator of the battery control unit blinks at 10 Hz, you cannot start the UPS in cold mode.
- If the green indicator of the battery control unit blinks at 1 Hz or is steady on, you can start the UPS in cold mode.

Step 5 When multiple SmartLi cabinets are combined.

1. If the green indicator of one battery control unit blinks at 10 Hz, turn on the battery circuit breaker on any SmartLi.

NOTICE

In this case, the green indicators of all battery control units are on for 1s and then off for 4s, you cannot turn on the battery circuit breakers on other SmartLi cabinets or start the UPS in cold mode.

2. After the green indicators of other battery control units blink at 10 Hz, turn on the battery circuit breaker on the SmartLi where the battery control unit blinks at 10 Hz one by one.

----End

5.2 Powering Off Batteries

Procedure

Step 1 Switch off the battery circuit breakers. (Perform this operation for multiple SmartLi cabinets one by one.)

Step 2 Press and hold the POWER ON/OFF button on the battery control unit for more than 5s. (Perform this operation for multiple SmartLi cabinets one by one.)

NOTICE

If batteries are powered off and will not be charged for more than a month, remove the battery control unit.

----End

5.3 Performing EPO

NOTICE

- After EPO is triggered, there is no SmartLi output.
- After EPO is triggered, the system reports a **Battery cabinet shutdown** alarm.

Press the external EPO switch that connects to the dry contact card or remove the 4-pin terminal on the EPO port of the dry contact card of the bypass unit.

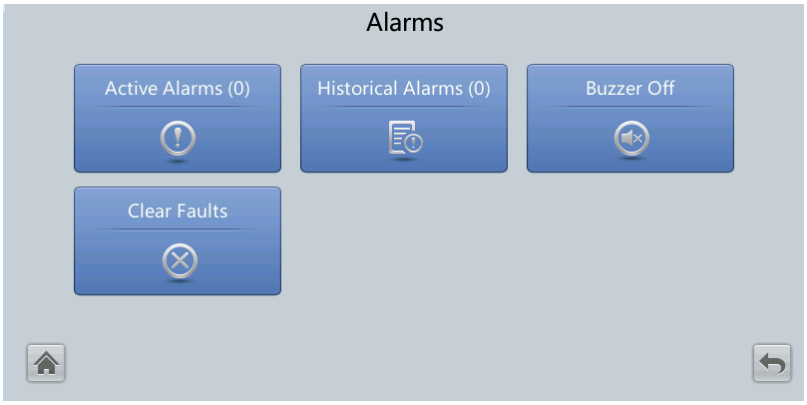
5.4 Clearing the EPO State

Procedure

Step 1 Clear the EPO state. Ensure that the EPO button connected to the external EPO is not in the EPO state.

Step 2 On the LCD screen, choose **Alarms** > **Clear Faults**. In the displayed dialog box, tap **Yes**. The **Battery cabinet shutdown** alarm is cleared successfully.

Figure 5-3 Clearing faults



Step 3 View active alarms and ensure that the **Battery cabinet shutdown** alarm has disappeared from the alarm list.

----End

5.5 Adding a SmartLi

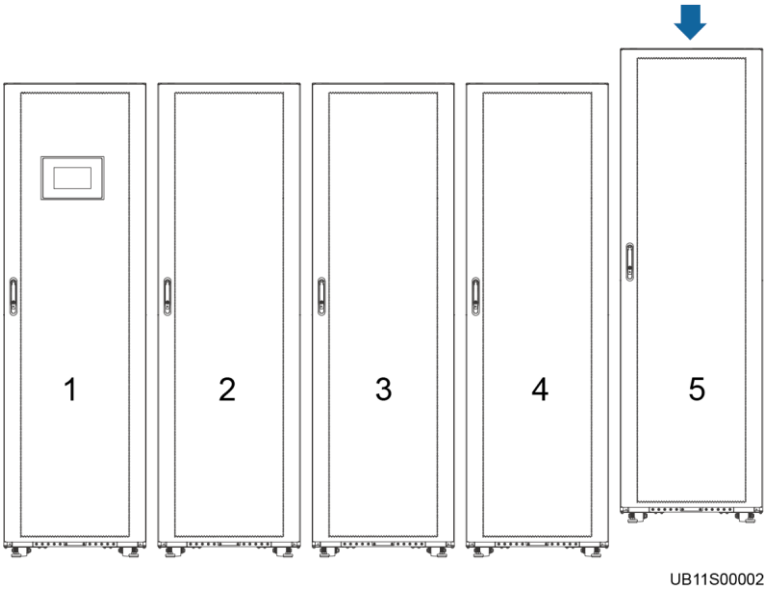
Prerequisites

For online capacity expansion, you need to configure an external circuit breaker to control the battery loop.

Context

This section describes how to add a SmartLi to four cabinets in parallel.

Figure 5-4 Adding a SmartLi



Procedure

Step 1 Install the new SmartLi.

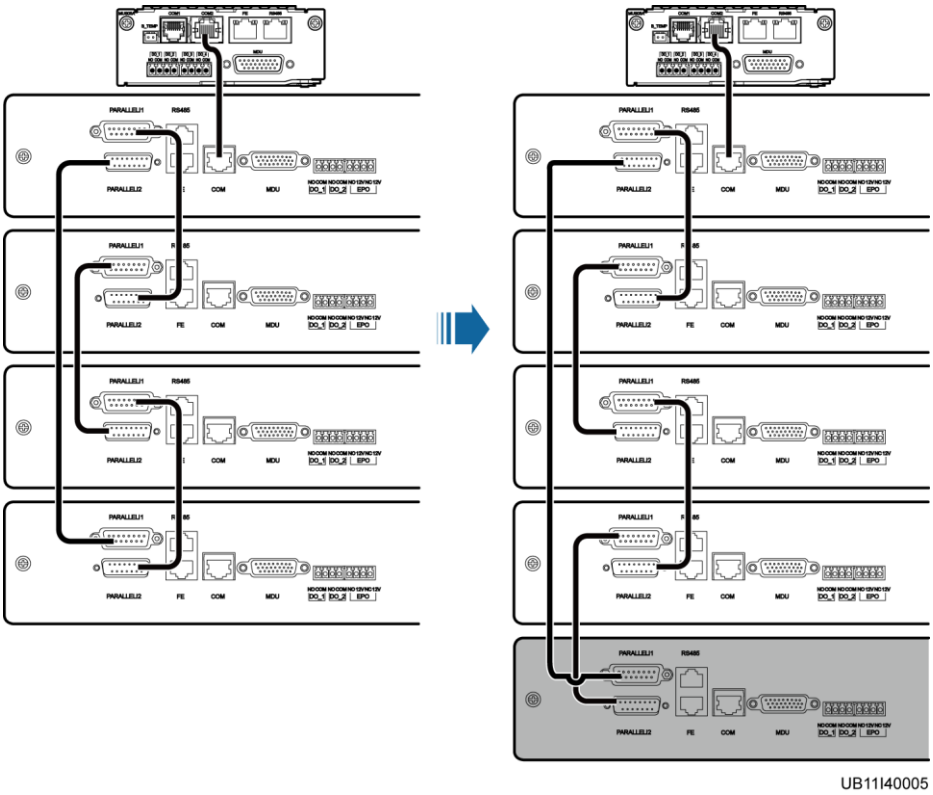
Step 2 Remove the terminal of parallel port 1 on SmartLi 4 and connect the terminal to parallel port 1 on SmartLi 5.

NOTE

On the monitoring module, **PARALLEL1** is above **PARALLEL2**.

Step 3 Connect parallel port 1 on SmartLi 4 to parallel port 2 on SmartLi 5.

Figure 5-5 Connecting control cables



Step 4 On the home screen, choose **Settings > System Settings**, and set **Battery cabinet quantity** to **5**.

NOTE

In this case, the **Cabinet quantity mismatch** alarm is generated.

Step 5 Power on the new SmartLi by referring to section "5.1 Powering On Batteries".

NOTICE

After pressing and holding the POWER ON/OFF button on the battery control unit of the new SmartLi for more than 2s, you need to confirm that the **Cabinet quantity mismatch** alarm is cleared before turning on the battery circuit breaker.

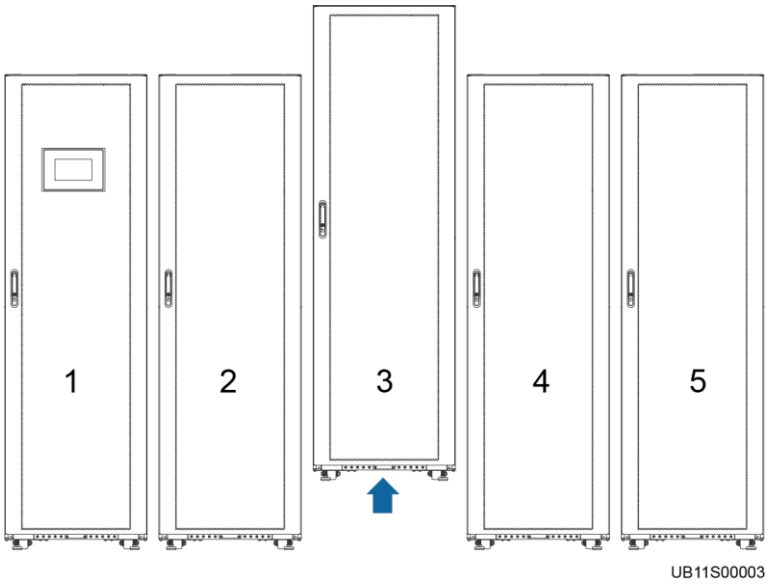
----End

5.6 Removing a SmartLi

Context

This section describes how to remove a SmartLi by using five cabinets in parallel as an example. The original system consists of five combined cabinets. Now, you need to remove SmartLi 3.

Figure 5-6 Removing a SmartLi



Procedure

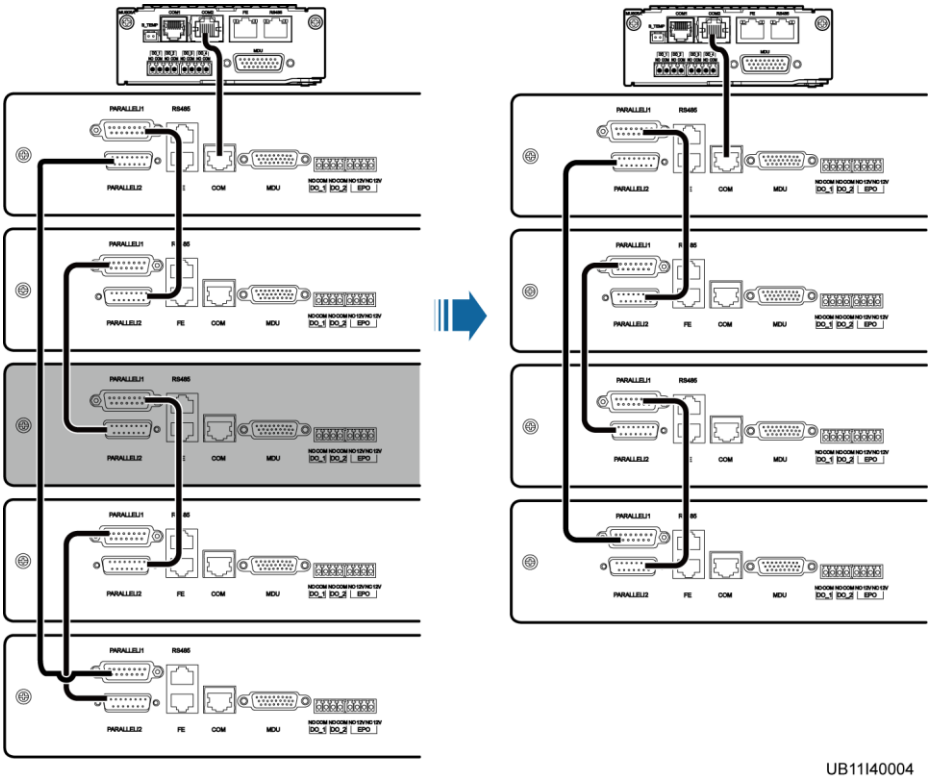
Step 1 Turn off the battery circuit breaker on SmartLi 3.

Step 2 Press and hold the POWER ON/OFF button on the battery control unit of SmartLi 3 for more than 5s.

Step 3 Remove the parallel cable between SmartLi 3 and SmartLi 4.

Step 4 Remove the terminal from parallel port 2 on SmartLi 3 and connect the terminal to parallel port 2 on SmartLi 4.

Figure 5-7 Removing control cables



Step 5 On the home screen, choose **Settings > System Settings**, and set **Battery cabinet quantity** to **4**.

----End

5.7 Testing Batteries

5.7.1 Shallow Discharge Test

NOTICE

Before performing a shallow discharge test, ensure that:

- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the state of charge (SOC) reaches 100%; and the load ratio fluctuation is less than 10%.
- The UPS generates no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.
- The SmartLi has generated no alarms related to lithium batteries.

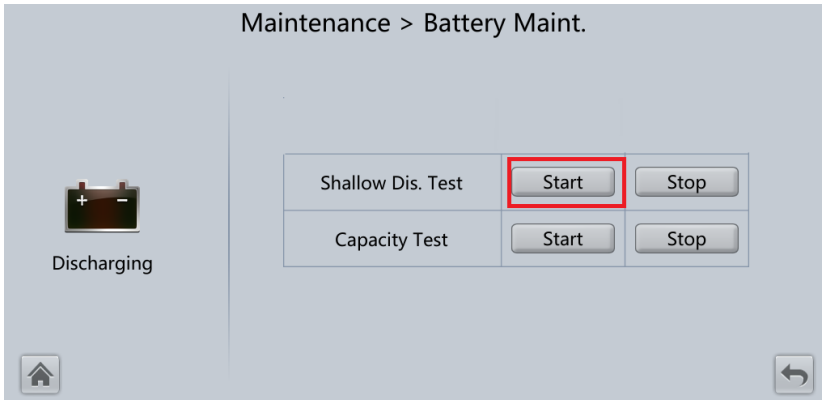
Automatic Shallow Discharge Test

1. On the home screen of the UPS LCD, choose **System Info** > **Settings** > **Battery Settings** and set **Sched. shallow dis. test** to **Enable**.
2. Set **Sched. shallow dis. test time** and **Sched. shallow dis. test interval** as required. After setting is complete, the system will perform automatic shallow discharge tests based on the settings.

Manual Shallow Discharge Test

1. On the home screen of the UPS LCD, choose **System Info** > **Maintenance** > **Battery Maint**.
2. Tap **Start** next to **Shallow Dis. Test** to start a shallow discharge test.

Figure 5-8 Starting a shallow discharge test



NOTE

When the battery test is complete, the test data is used as common test data. Record the data obtained from the latest five tests.

The shallow discharge test automatically stops in any of the following cases:

- The battery discharge capacity reaches the specified value (10%–50%, 20% by default).
- The discharge voltage reaches the warning threshold (calculated in real time).
- The load ratio fluctuation exceeds 10%.
- An alarm is generated.

5.7.2 Capacity Test

Context

NOTICE

Before a capacity test, ensure that:

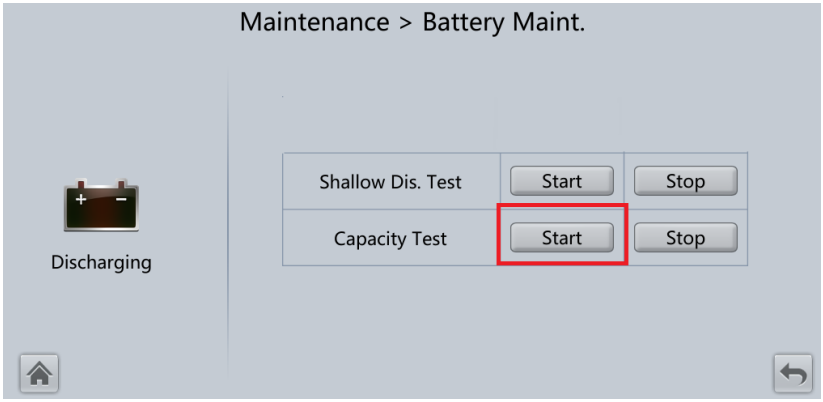
- The UPS is working in normal mode; float charging or hibernation has lasted for 2 hours after the state of charge (SOC) reaches 100%; and the load ratio fluctuation is less than 10%.
- The UPS has generated no battery overtemperature, overvoltage, or overcurrent alarm. No generator is connected to the UPS.
- The mains, batteries, charger, and discharger are normal. No overload alarm is generated.
- The SmartLi has generated no alarms related to lithium batteries.

Procedure

Step 1 On the home screen of the UPS LCD, choose **System Info** > **Maintenance** > **Battery Maint**.

Step 2 Tap **Start** next to **Capacity Test** to start a capacity test.

Figure 5-9 Starting a capacity test



NOTE

The capacity test automatically stops in any of the following cases:

- The minimum cell voltage reaches 2.6 V.
- The load fluctuation exceeds 10%.
- An alarm is generated.

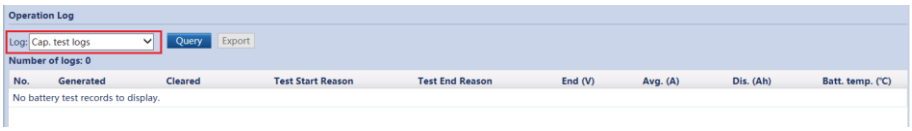
The test is complete when the minimum cell voltage reaches 2.6 V. Data about the most amount of energy discharged is stored once a month for 36 months.

----End

5.7.3 Test Data Download

1. On the UPS WebUI, choose **Query** > **Operation Log**, choose logs that need to be queried from the **Log** drop-down list box, and click **Query**.

   Figure 5-10 Operation Log

2. Choose logs that have been queried from the **Log** drop-down list box, and click **Export**.

6 Routine Maintenance

- Before installing batteries, read through the battery user manuals and pay attention to safety precautions and connection methods.
- Before battery maintenance, get the tools, such as handles, insulated.
- Keep the battery switch off when installing or maintaining the batteries.
- Before installing and maintaining the battery modules, remove the battery control unit, and reinstall the battery control unit after the installation or maintenance is complete.
- When moving batteries, handle batteries gently, and pay attention to personal safety.
- Never use any organic solvent to clean batteries.
- Never smoke or have an open flame around batteries.
- After battery discharge, charge the battery in time to maintain a good service life.
- Only professionals are allowed to perform the maintenance tasks.

Table 6-1 Routine maintenance

Maintenance Interval	Check Item	Handling Measures
Monthly	Operating environment	Keep the SmartLi far away from heat sources and avoid direct exposure to sunlight.
	Appearance	If a battery module experiences damage, leakage, or deformity, disconnect, take pictures, and then replace the battery module.
	Checking the pressure gauge	If the pointer is in the red zone, contact Huawei technical support.
Quarterly	Cleanliness	Clean the battery module exterior using cotton cloth. Exercise caution when cleaning a battery module because its voltage is high.
	Connection	Check the bolt at every terminal and tighten any loose bolt. If cable temperature exceeds 40°C (feels hot), locate the cause.
Yearly	Voltage	• Measure and record the busbar voltage, and the positive and negative voltages of the SmartLi when charging is about to complete.

Maintenance Interval	Check Item	Handling Measures
		Ensure that the voltages are the same. If the voltages are different, check for cable faults and rectify them. • In the first year, collect real-time data when discharging is about to complete at least once every six months. • From the second year, check the capacity quarterly.

7 Troubleshooting

CAUTION

Do not clear alarms by reinstalling modules.

Table 7-1 Troubleshooting

Case	Symptom	Possible Cause	Measure
Battery module abnormal	The indicator of the battery module is red or off.	The battery module is faulty.	Replace the battery module.
		The communications cable to the battery module is not connected.	Reconnect the communications cable.
Battery control unit abnormal	The indicator is yellow or red.	The battery cabinet generates a minor alarm.	Handle the alarm according to the alarm reference.
		The battery cabinet generates a critical alarm.	

NOTE

For details about component replacement and maintenance involved in Troubleshooting and Alarm List, consult Huawei maintenance engineers.

8 Replacing Parts

8.1 Replacing the MDU

Prerequisites

- Tools: Phillips screwdriver, key to the cabinet door
- Materials: a new and intact MDU

NOTICE

- The MDU can be replaced online without cutting off the power supply to the SmartLi.
- Before the replacement, ensure that the load services are not affected or obtain written consent from the customer.

Procedure

Step 1 Remove the communications cable from the MDU and mark the connection position.

Step 2 Remove the four screws from the MDU using the Phillips screwdriver and set them aside.

Step 3 Hold the MDU front panel by one hand, and push out the MDU from the fastener on the front panel by the other hand.

Step 4 Install the new MDU and secure it.

Step 5 Reinstall the communications cable to the new MDU.

Step 6 After replacement and during startup, the MDU automatically checks whether its configurations are consistent with the rack configuration. If inconsistent, the MDU displays a synchronization dialog box.

- If you click **OK**, the configurations will be synchronized, and the MDU automatically restarts.
- If you click **Cancel** (not recommended), the configurations will not be synchronized, and the MDU displays the same dialog box during the next startup.

NOTICE

If the **Version incompatible** alarm is generated, you need to upgrade the version before turning on the battery circuit breaker.

----End

8.2 Replacing the Battery Control Unit

Prerequisites

- Tools: Phillips screwdriver, key to the cabinet door
- Materials: a new and intact battery control unit
- The SmartLi is not discharging.

NOTICE

Before the replacement, ensure that the load services are not affected or obtain written consent from the customer.

Procedure

Step 1 Turn off the battery circuit breaker. Press and hold down the POWER ON/OFF button on the battery control unit for more than 5s to power off the cabinet.

Step 2 Turn off the ready switch on the battery control unit.

Step 3 Remove the bolts that secure the battery control unit and pull out the battery control unit.

Step 4 Install the new battery control unit and secure it.

Step 5 Turn on the ready switch on the battery control unit.

Step 6 Press and hold the POWER ON/OFF button on the battery control unit for more than 2s. The green indicator of the battery control unit blinks at 4 Hz.

NOTICE

If the **Version incompatible** alarm is generated, you need to upgrade the version before turning on the battery circuit breaker.

Step 7 After the green indicator of the battery control unit blinks at 10 Hz, turn on the battery circuit breaker on the SmartLi.

----End

8.3 Replacing the Battery Module

Prerequisites

- Tools: Phillips screwdriver, insulated socket wrench, insulation gloves, key to the cabinet door
- Materials: a new and intact battery module
- The SmartLi is not discharging.

NOTICE

Before the replacement, ensure that the load services are not affected or obtain written consent from the customer.

Procedure

Step 1 Turn off the battery circuit breaker. Press and hold down the POWER ON/OFF button on the battery control unit for more than 5s to power off the cabinet.

Step 2 Turn off the ready switch on the battery control unit.

Step 3 Remove the bolts that secure the battery control unit and pull out the battery control unit for about 10 cm.

Step 4 Remove the front covers from the faulty battery module, the battery modules below and above the faulty one.

NOTE

If the faulty battery module is at the top or bottom, you need to remove the front covers from the faulty battery module, the battery module below or above the faulty one.

Step 5 Remove the cables and copper bars that are connected to the faulty battery module.

Step 6 Remove the battery baffle plate and pull out the faulty battery module.

Step 7 Install the new battery module and secure the baffle plate.

Step 8 Reinstall the cables, copper bars, and front covers to the battery modules.

Step 9 Reinstall the battery control unit and turn on the ready switch.

Step 10 Press and hold the POWER ON/OFF button on the battery control unit for more than 2s. The green indicator of the battery control unit blinks at 4 Hz.

NOTICE

If the **Version incompatible** alarm is generated, you need to upgrade the version before turning on the battery circuit breaker.

Step 11 After the green indicator of the battery control unit blinks at 10 Hz, turn on the battery circuit breaker on the SmartLi.

----End

8.4 Upgrade Software

NOTICE

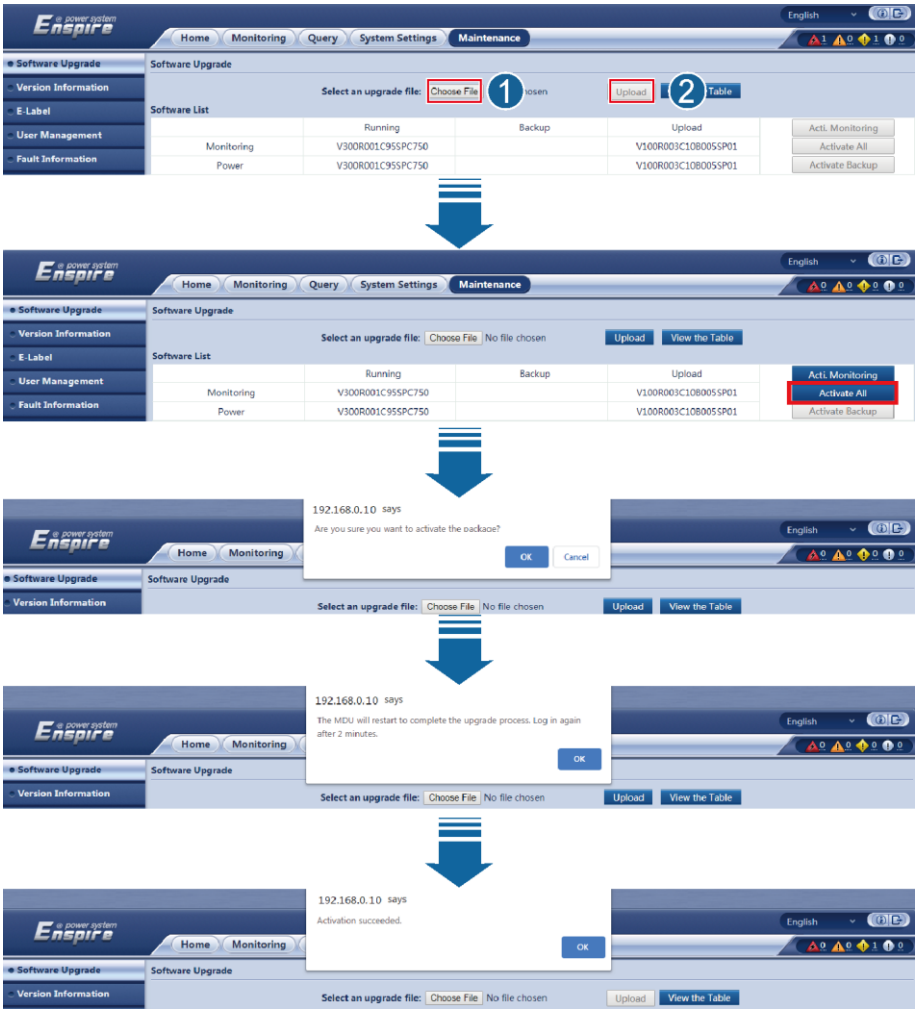
- If a **Version incompatible** alarm is generated during the replacement of the MDU, battery module, or battery control unit, upgrade the software version.
- Ensure that the software of the required version is available before upgrading the software.
- When upgrading the software on the LCD, save the software to a USB flash drive and connect it to the USB port on the MDU.
- When upgrading the software on the WebUI, save the software to a portable computer and log in to the WebUI.
- Perform the upgrade when the system is not in discharge state and the BCB status is the same (all are closed or open).
- Before the upgrade, ensure that the load services are not affected or obtain written consent from the customer.

WebUI

Choose **Maintenance** > **Software Upgrade**, select **Choose File**, find the correct package in the corresponding path, and click **Upload**. After the upload is complete, choose **Activate All** in the **Software List** and perform operations as prompted.

Figure 8-1 Uploading and activating the software (the BCB switches of all battery cabinets are ON)

Figure 8-2 Uploading and activating the software (the BCB switches of all battery cabinets are OFF)



NOTE

The system starts the upgrade process. The upgrade sequence is MDU, battery cabinet 1, battery cabinet 2, ..., and battery cabinet *N*. The upgrade progress percentage is displayed in the corresponding **Status** column. During the MDU upgrade, the message **The MDU will restart to complete the upgrade process. Log in after 2 minutes.** is displayed. Click **OK**. The MDU will restart to complete the upgrade task. Wait for about 2 minutes and log in to the WebUI again.

LCD

Choose **Maintenance** > **USB Operations** > **Upgrade Software**, tap **Upload** and find the correct package in the corresponding path. After the upload is complete, tap **Details**. On the screen displayed, select **All**, tap **Activate**, and perform operations as prompted.

Figure 8-3 Uploading and activating the software (the BCB switches of all battery cabinets are ON)

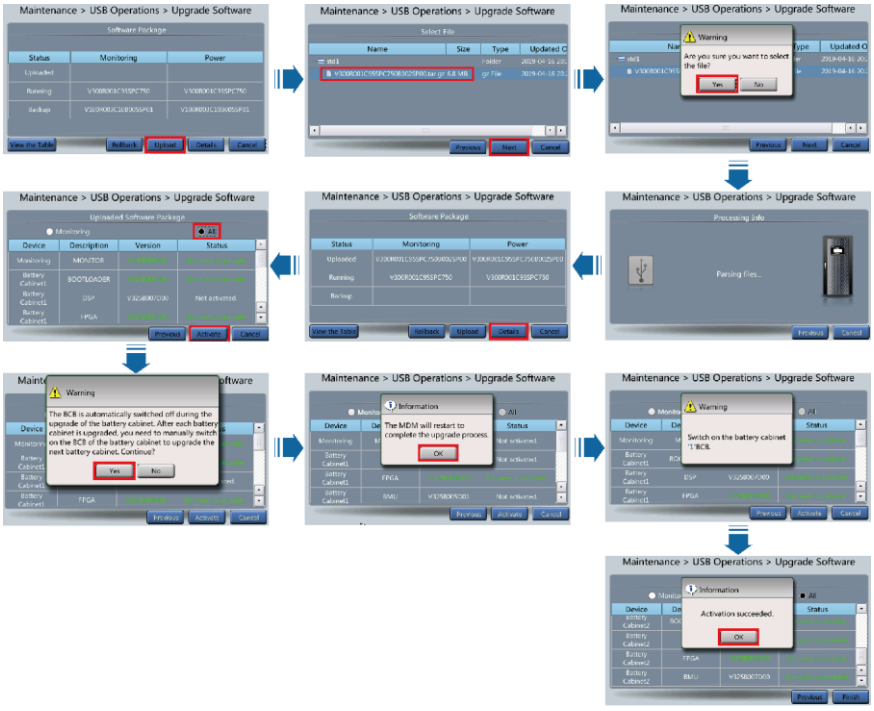
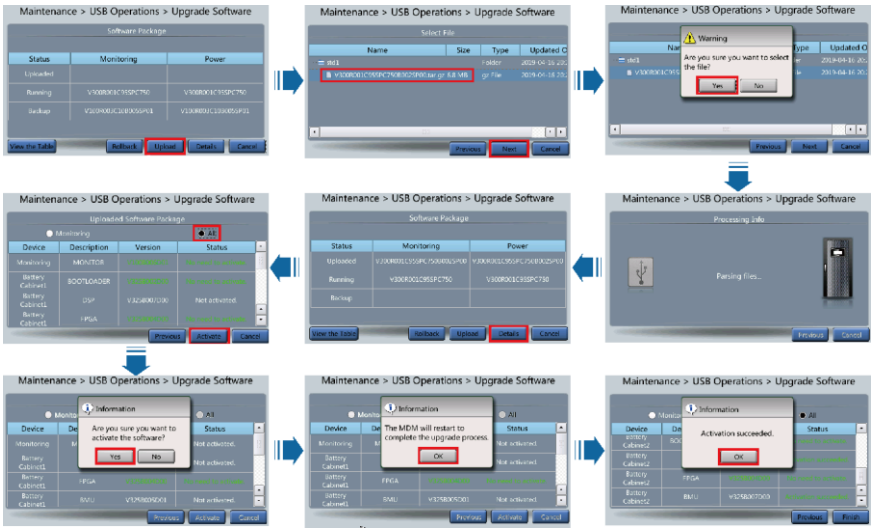


Figure 8-4 Uploading and activating the software (the BCB switches of all battery cabinets are OFF)



8.5 Replacing a Fire Cylinder

Prerequisites

- Tools: insulated socket wrench, insulation gloves, Phillips screwdriver, key to the cabinet door, torque wrench, pipe cutter, and pipe holder
- Materials:
  - Check the fire cylinder and all components for any damage, abrasion, or corrosion. If there is any visible abrasion or corrosion, replace the damaged components and all corroded components.
  - Check that the valve is closed (vertical to the cylinder).
  - Fill the fire cylinder with extinguishant. The recommended extinguishant is heptafluoropropane or perfluorohexanone.

NOTICE

Before the replacement, ensure that the load services are not affected or obtain written consent from the customer.

Procedure

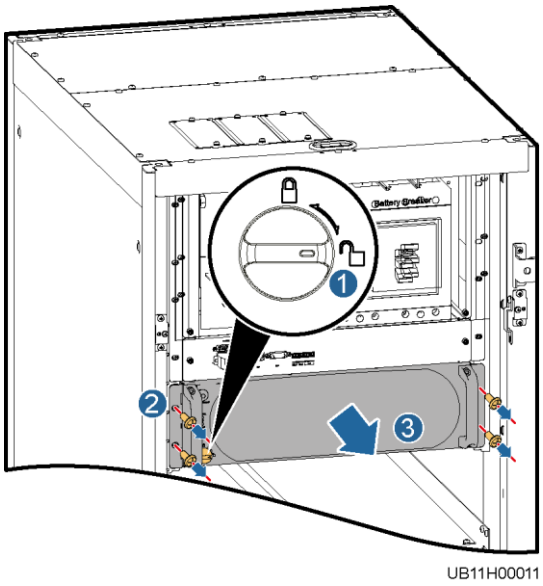
Step 1 Check the fire cylinder.

- Check that the valve is closed (vertical to the cylinder).
- Check that the pointer of the pressure gauge on the fire cylinder is in the green zone.

Step 2 Open the front door of the cabinet and switch off the battery circuit breaker. Press and hold down the POWER ON/OFF button on the battery control unit for more than 5s to power off the cabinet.

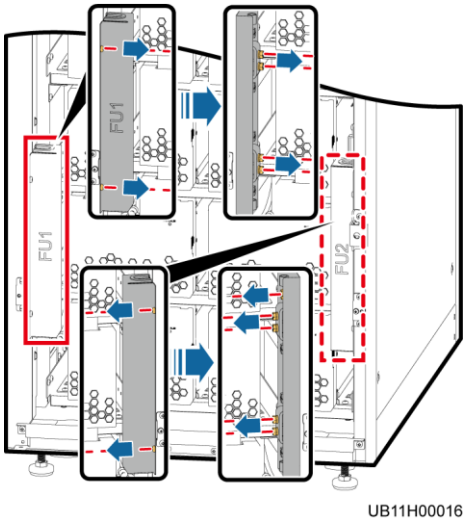
Step 3 Turn off the ready switch on the battery control unit, remove the bolts that secure the battery control unit, and pull out the module for about 10 cm.

Figure 8-5 Pulling out the battery control unit



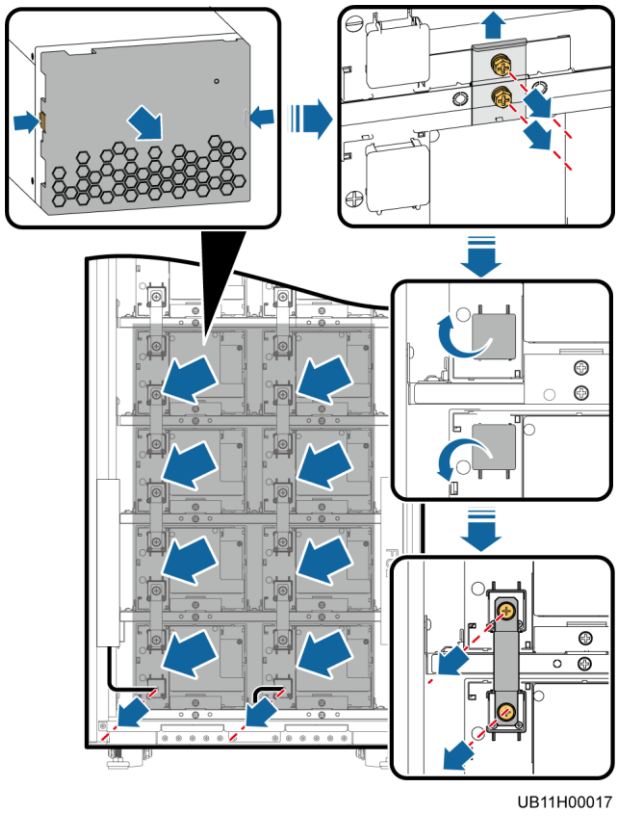
Step 4 Remove the fuse box and certain cables.

Figure 8-6 Removing the fuse box



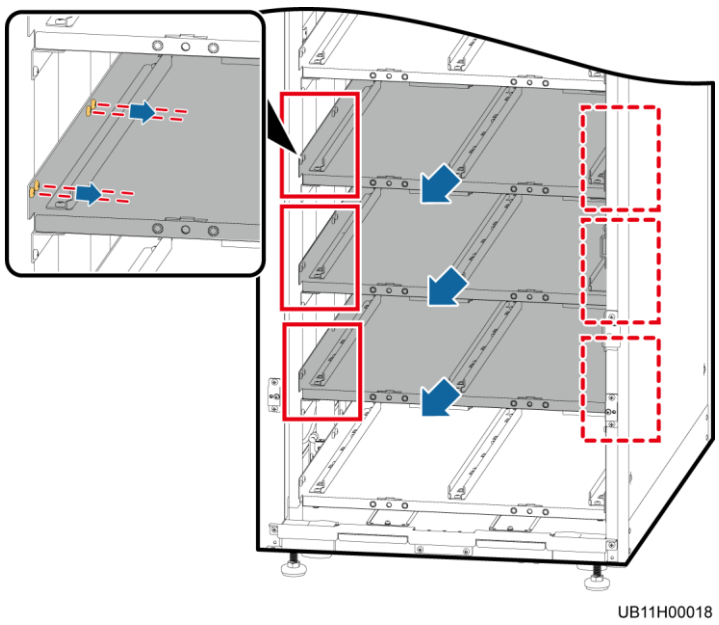
Step 5 Remove the battery modules, copper bars, and cables from the lower four layers.

Figure 8-7 Removing the battery modules



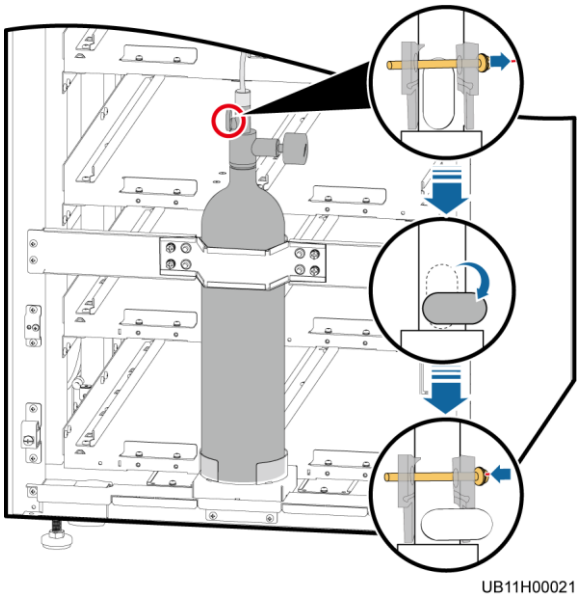
Step 6 Remove the battery trays from the lower second, third, and fourth layers.

Figure 8-8 Removing the battery trays



Step 7 Remove the positioning kit, close the valve, reinstall the positioning kit, and secure it.

Figure 8-9 Closing the valve



Step 8 Remove the fire cylinder.

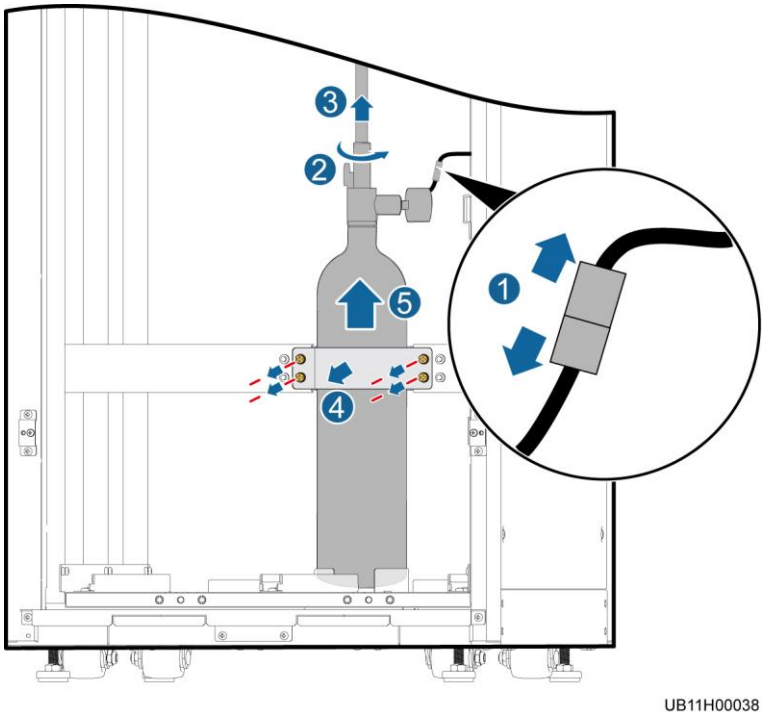
1. Remove the terminals interconnecting the dry contact cable of the fire cylinder and the cable reserved on the side of the cabinet.
2. Remove the connection nut.

NOTICE

The fire-trace tube may contain high-pressure extinguishant. Loosen the connection nut slowly; otherwise, extinguishant may be released unexpectedly.

3. Remove the fire-trace tube.
4. Remove the fire cylinder fastener.
5. Take out the fire cylinder.

Figure 8-10 Removing the fire cylinder



Step 9 Install a new fire cylinder. Keep it upright.

Step 10 Install the fire-trace tube on the fire cylinder.

NOTICE

Do not bend or twist the fire-trace tube or bind the tube using cable ties. Otherwise, the fire cylinder may fail.

1. Cut off the end of the fire-trace tube evenly.

NOTICE

- Ensure that the wall thickness at the end of the fire-trace tube is consistent.
- Ensure that the fire-trace tube, threaded nozzle, and end adapter are clean and free of dust.

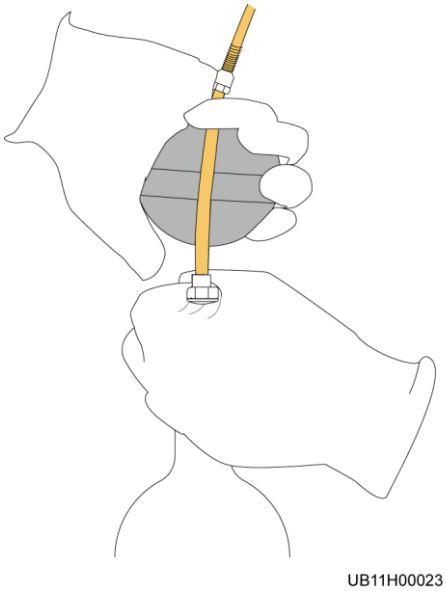
Figure 8-11 Cutting off the end of the fire-trace tube

2. Clamp the end of the fire-trace tube to the threaded nozzle using a pipe holder.

NOTICE

- Hold the pipe holder close to the end to avoid bending the tube during pipe insertion.
- Ensure that the nut and riser screw thread are routed through the fire-trace tube.

Figure 8-12 Install a fire-trace tube



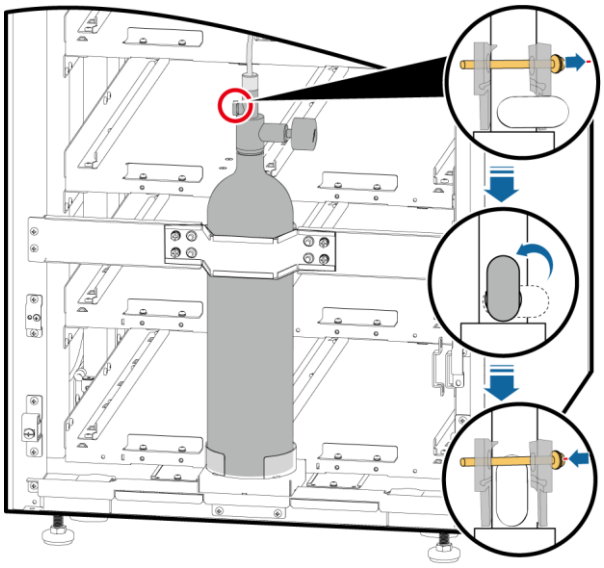
3. Tighten the connection nut to 7 N·m using an adjustable torque wrench.

Step 11 Remove the valve positioning kit, open the valve, reinstall the positioning kit, and secure it.

NOTICE

Slowly open the valve. To avoid unexpected blowout, do not quickly open the valve.

Figure 8-13 Opening the valve



Step 12 Interconnect the dry contact cable of the fire cylinder and the cable reserved on the side of the cabinet.

Step 13 Check the end pressure gauge on the front of the cabinet. The pointer should be in the green zone and the pressure reading should be greater than 1.6 Mpa at 20℃. Record the reading of the pressure gauge. 8 hours later, observe the pressure gauge again. The pressure reading should remain unchanged.

Step 14 Reinstall the battery modules, baffle panels, copper bars, cables, front panel, and fuse box in sequence.

Step 15 Reinstall the battery control unit.

Step 16 Press and hold the POWER ON/OFF button on the battery control unit for more than 2s. The green indicator of the battery control unit blinks at 4 Hz.

Step 17 After the green indicator of the battery control unit blinks at 10 Hz, switch on the battery circuit breaker on the SmartLi.

----End

9 Technical Specifications

Table 9-1 Physical specifications

Item	Specifications
Cabling	Cables can be routed in and out from the top.
IP rating	IP20
Dimensions (H x W x D)	2000 mm x 600 mm x 850 mm
Communication	Supports RS485, FE, and CAN.
Weight	< 750 kg
Circuit breaker specifications	690 V AC/750 V DC, 500 A, 4P
Fuse specifications	Each battery string is configured with an 800 V DC 250 A fuse.

Table 9-2 Environmental specifications

Item	Specifications
Operating temperature	0°C–40°C
Storage temperature	0°C–45°C
Relative humidity	5%–95% RH (non-condensing)
Altitude	0–4000 m

Table 9-3 Safety and EMC

Item	Specifications
Safety regulations	IEC/EN62619
EMC	EN62040-2

Item	Specifications
	EN61000-4-3 EN61000-4-6 EN61000-6-2 EN61000-6-4 IEC62040-2 IEC61000-4-2 IEC61000-4-3 IEC61000-4-4 IEC61000-4-5 IEC61000-4-6 IEC61000-4-8 IEC61000-6-2 IEC61000-6-4

Table 9-4 Electrical specifications

Item	Specifications
Rated voltage	512 V (3.2 V/cell)
Charge voltage	544 V (3.4 V/cell)
Rated capacity	80 Ah
Charge current	≤ 1C, 0.5C by default

Table 9-5 Protection function

Item	Specifications
Battery overvoltage protection	• Cell: Level-1 protection: > 3.65 V; level-2 protection warning: > 3.8 V; level-2 protection: > 3.9 V • Battery string: Level-1 protection: > 564 V; level-2 protection warning: > 568 V; level-2 protection: > 580 V
Battery undervoltage protection	• Cell: Undervoltage warning: < 2.6 V; level-1 protection: < 2.5 V; level-2 protection: < 2.3 V • Battery string: Undervoltage warning: < 448 V; protection: < 408 V
Overtemperature protection	Charge: > 60°C; discharge: > 65°C

Item	Specifications
Undertemperature protection	Charge and discharge: < –5°C
Overcurrent protection	• Charge: Level-1 protection: > 96 A; level-2 protection: > 200 A • Discharge: Level-1 protection: > 420 A; level-2 protection: > 480 A
EPO protection	You can trigger the SmartLi EPO protection by performing EPO on the UPS or over the specified dry contact of the SmartLi.

A Alarm List

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0612-1	Battery module fault	Critical	• The sampling connecter is not firmly connected. • The board sampling circuit of the battery module is faulty. • The battery module is faulty.	Replace the faulty battery module.
0612-2	Battery module fault	Critical	• The sampling connecter is not firmly connected. • The board sampling circuit of the battery module is faulty. • The battery module is faulty.	Replace the faulty battery module.
0021-5	Battery EOD	Critical	The battery voltage reaches the EOD threshold due to continuous discharge.	1. Check the status of the battery cabinet and turn on the battery switch. 2. Check the input source and charge batteries in a timely manner.
0024-2	Battery undertemperature	Minor	The cell temperature is too low.	Take measures to increase the ambient temperature.
0023-2	Battery overtemperature	Minor	The cell temperature is too high.	Take measures to reduce the ambient temperature.
0025-2	Battery overvoltage	Minor	The cell voltage is	1. Check the power cabinet

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			too high.	status. 2. Check the lithium battery cabinet status.
0026-4	Battery undervoltage	Minor	The cell voltage is too low.	Check the power cabinet status.
0616-1	Battery undertemperature protection	Critical	The charger temperature is too low.	Take measures to increase the ambient temperature.
0031-2	Battery overtemperature protection	Critical	The battery temperature is too high.	Take measures to reduce the ambient temperature.
0032-3	Battery overvoltage protection	Critical	The voltage of a single cell is too high.	1. Check the power cabinet status. 2. Check the lithium battery cabinet status.
0617-1	Battery overvoltage protection	Critical	The voltage of a single cell is too high.	Check the power cabinet status.
0612-5	Battery module fault	Critical	• The sampling connecter is not firmly connected. • The board sampling circuit of the battery module is faulty. • The battery module is faulty.	Replace the faulty battery module.
0612-6	Battery module fault	Critical	• The sampling connecter is not firmly connected. • The board sampling circuit of the battery module is faulty. • The battery module is faulty.	Replace the faulty battery module.
0612-7	Battery module fault	Critical	• The sampling connecter is not firmly connected. • The board sampling circuit of the battery	Replace the faulty battery module.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			module is faulty. • The battery module is faulty.	
0025-3	Battery overvoltage	Minor	The battery voltage reaches the high-voltage alarm threshold.	1. Check the power cabinet status. 2. Check the lithium battery cabinet status.
0027-2	Battery overcurrent	Minor	The battery charge current reaches the overcurrent alarm threshold.	1. Check the power cabinet status. 2. Check the lithium battery cabinet status.
0026-5	Battery undervoltage	Minor	• The battery voltage reaches the low-voltage alarm threshold. • The input fuse is blown.	1. Check the input source and charge batteries in a timely manner. 2. Check whether the input fuse is normal.
0027-3	Battery overcurrent	Minor	The battery discharge current reaches the overcurrent alarm threshold.	1. Check whether the power cabinet is overloaded. 2. Reduce the power cabinet load to a proper range. 3. Check the lithium battery cabinet status.
0617-2	Battery undervoltage protection	Critical	The battery string overdischarges.	Check the input source, and charge batteries in a timely manner.
0621-3	Battery overcurrent protection	Critical	The battery charge or discharge current reaches the protection threshold.	1. Check whether the load of power cabinet exceeds the battery configuration. 2. Replace the battery control unit.
0032-5	Battery overvoltage protection	Critical	The battery voltage exceeds the overvoltage protection threshold.	1. Check whether the battery voltage is normal. 2. Replace the battery control unit.
0620-6	Battery control unit fault	Critical	The battery control unit is abnormal.	Replace the battery control unit.
0620-7	Battery control unit fault	Critical	The battery control unit is abnormal.	Replace the battery control unit.
0620-8	Battery control unit fault	Critical	The battery control unit is abnormal.	Replace the battery control unit.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0625-1	Inter-battery cabinet parallel cable alarm	Minor	The communications cable between cabinets is not properly connected.	Check the cable connection of the inter-rack parallel cable.
0635-1	Battery module not detected	Critical	The battery control unit does not receive an online query response from the battery module.	1. Check whether the signal terminal of the battery module is properly connected. 2. Replace the battery module.
0619-1	BCB tripping fault	Critical	The BCB box is faulty.	1. Check whether the BCB box runs properly. 2. Check whether the connection between the BCB box and the board is normal.
0362-4	BCB off	Critical	• The BCB switch is turned off. • The BCB switch status signal cable is abnormal.	1. Turn on the BCB switch. 2. Check whether the BCB switch status signal cable is properly connected.
0620-1	Battery control unit fault	Critical	The relay of the battery control unit is arcing.	Replace the battery control unit.
0620-2	Battery control unit fault	Critical	The auxiliary power supply of the battery control unit is abnormal.	Replace the battery control unit.
0620-3	Battery control unit fault	Critical	The balanced circuit works abnormally.	Replace the battery control unit.
0620-4	Battery control unit fault	Critical	The balanced circuit works abnormally.	Replace the battery control unit.
0043-14	Fan abnormal	Critical	The fan is abnormal.	Replace the battery control unit.
0621-1	Battery overcurrent protection	Critical	The charger of the battery control unit is faulty.	Replace the battery control unit.
0621-2	Battery overcurrent protection	Critical	• The load exceeds the upper threshold. • The battery control unit is damaged.	1. Check whether the load of power cabinet exceeds the battery configuration. 2. Replace the battery control unit.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
0623-1	Battery cabinet EPO	Critical	The emergency shutdown signal of the battery cabinet is activated.	Manually clear the EPO state.
0624-4	Not ready	Critical	The ready switch is not turned off.	Turn on the ready switch.
0620-5	Battery control unit fault	Critical	The hardware overtemperature protection signal is valid.	1. Check whether the ambient temperature is too high. 2. Replace the battery control unit.
0032-4	Battery overvoltage protection	Critical	• The battery string is abnormal. • The battery control unit is abnormal.	1. Check the battery voltage. 2. Replace the battery control unit.
0628-1	Abnormal signal board	Critical	The signal transfer board is faulty.	1. Check the cable connection to the signal transfer board. 2. Replace the signal transfer board.
0629-1	Abnormal inter-battery cabinet parallel cable	Critical	The inter-rack parallel system CAN is faulty.	1. Check whether the inter-rack parallel cable is loose. 2. Replace the inter-rack parallel cable. 3. Replace the battery control unit or the signal transfer board.
0629-2	Abnormal inter-battery cabinet parallel cable	Critical	• The inter-rack parallel cable is not properly connected. • The 1# battery control unit is faulty or the connected 2# battery control unit is faulty.	1. Check whether the inter-rack parallel cable is loose. 2. Replace the inter-rack parallel cable. 3. Replace the battery control unit or the signal transfer board.
0630-1	Abnormal intra-battery cabinet parallel cable	Critical	The intra-rack parallel CAN is faulty.	1. Check that the communications cables inside the battery cabinet are properly connected. 2. Replace the communications cable between the battery control unit and the battery

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
				modules. 3. Replace the battery control unit.
0630-2	Abnormal intra-battery cabinet parallel cable	Critical	The RS485 communications cable in the rack is faulty.	1. Check that the communications cables inside the battery cabinet are properly connected. 2. Replace the communications cable between the battery control unit and the battery modules. 3. Replace the battery control unit.
0630-3	Abnormal intra-battery cabinet parallel cable	Critical	The battery control unit is not properly connected to the signal transfer board.	1. Check whether the cable between the battery control unit and the signal transfer board is loose. 2. Replace the battery control unit or the signal transfer board.
0620-9	Battery control unit fault	Critical	The intra-rack parallel cable is faulty.	Replace the battery control unit.
0631-2	Version incompatible	Critical	The DSP software version does not match the battery control unit.	Load the software.
0631-3	Version incompatible	Critical	The FPGA software version does not match the battery control unit.	Load the software.
0631-4	Version incompatible	Critical	The battery module software is incompatible.	Load the software.
0631-1	Version incompatible	Critical	The software version does not match the battery control unit.	Load the software.
0632-1	Lithium battery system communication failure	Minor	The communication between the UPS monitoring unit and the lithium battery is interrupted.	Check the cable between the power cabinet monitoring unit and the lithium battery.
0174-2	Software package	Critical	The package of the power unit or	Upload the software packages of the power unit or module and

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
	not exist		module does not exist in the monitoring system.	MDU, and activate all the packages.
0246-2	Cabinet quantity mismatch	Minor	The configured number of battery cabinets does not match the actual available number.	1. Set the number of battery cabinets to be the same as the actual number. 2. Check the parallel cable connection.
0633-1	Lithium battery capacity mismatch	Minor	The number of configured UPS modules exceeds the upper limit supported by the lithium battery cabinet.	Reduce the number of UPS modules or add a lithium battery cabinet.
0636-1	Battery module balance alarm	Minor	• There is no enough time for cell balancing. • The cell balancing cable is faulty.	1. Turn on the charger of the power cabinet and keep balancing for three days. Check whether the alarm is cleared. 2. Replace the battery module.
0636-2	Battery module balance alarm	Minor	The electrochemical cell temperature consistency is poor.	Replace the battery module.
0620-10	Battery control unit fault	Critical	The voltage sampling circuit is faulty.	Replace the battery control unit.
0620-11	Battery control unit fault	Critical	The current CT sampling circuit is faulty.	Replace the battery control unit.
0620-12	Battery control unit fault	Critical	• The battery input cable is not connected. • The battery input fuse is open-circuited. • The battery control unit is faulty.	1. Check the battery cable connection. 2. Replace the input fuse. 3. Replace the battery control unit.
0021-6	Battery EOD	Critical	The battery voltage reaches the EOD threshold due to continuous	Check the mains, turn on the BCB switch and charge batteries in time.

Alarm ID (Alarm ID-Cause ID)	Alarm Name	Severity	Cause	Solution
			discharge.	
0220-3	Abnormal SOH	Minor	The state of health of a battery is abnormal.	1. Fully charge the batteries, and perform a capacity test. 2. Replace the abnormal battery.
0651-1	Fire extinguisher started	Critical	• The fire extinguisher in the battery cabinet is triggered. • The fire cylinder in the battery cabinet leaks.	1. Check the terminal firefighting pressure gage in the battery cabinet. 2. Replace the firefighting bottle.

B Acronyms and Abbreviations

B	
BCU	Battery Control Unit
C	
CE	Conformite Europeenne
E	
EOD	End of discharge
I	
IEC	International Electrotechnical Commission
L	
LCD	Liquid crystal display
M	
MDU	Monitor display unit
N	
NMS	Network management system
P	
PE	Protective earthing

R	
RS485	Recommend Standard 485
S	
SOC	State of charge
SOH	State of health
U	
UPS	Uninterruptible power system

